United States Department of Agriculture

NRCS

Natural Resources Conservation Service

In cooperation with Michigan Department of Agriculture; Michigan Agricultural Experiment Station; Michigan State University, Cooperative Extension Service; and Michigan Technological University

Soil Survey of Marquette County, Michigan

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

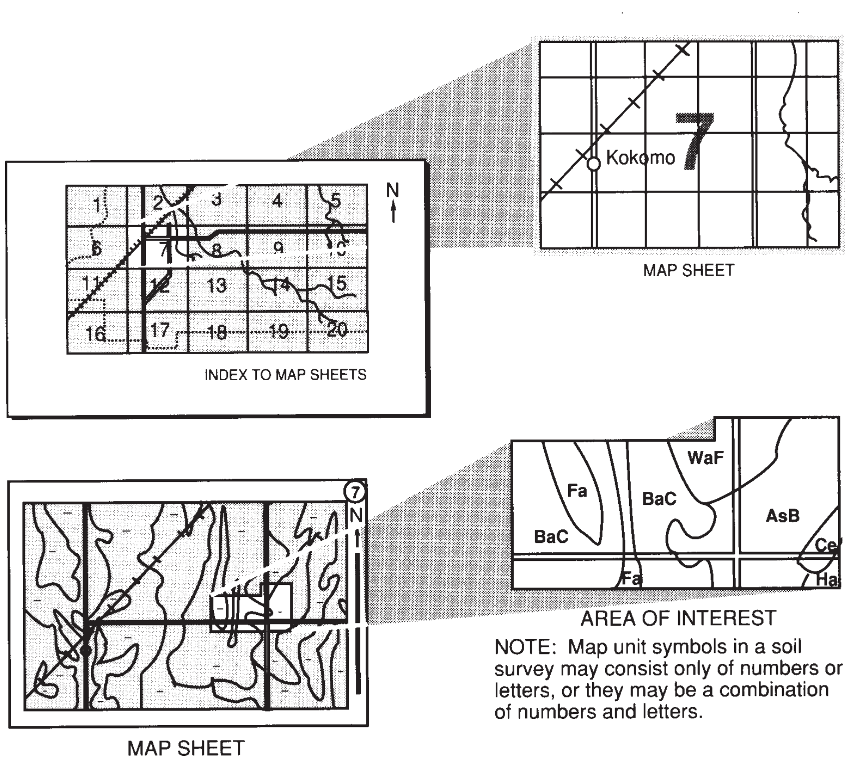
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service; the Michigan Department of Agriculture; the Michigan Agricultural Experiment Station; Michigan State University, Cooperative Extension Service; and Michigan Technological University. The survey is part of the technical assistance furnished to the Marquette County Soil and Water Conservation District. Financial assistance was provided by the Marquette County Board of Commissioners.

Major fieldwork for this soil survey was completed in 1996. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. The most current official data are available on the Internet.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Nondiscrimination Statement

Cover Photo Caption

An area of the Keewaydin-Michigamme-Rock outcrop association showing the rugged nature of the Huron Mountain region. The lake in the photo is Ives Lake, one of several lakes in the survey area.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2007

Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, foresters, and agronomists can use the surveys to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

John Bricker
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Marquette County, Michigan

By Charles Schwenner, Natural Resources Conservation Service

Fieldwork by Jamie Antoniewicz, William Anzalone, Loren Berndt, Thomas Berndt, Lawrence Carey, Gerald Davis, Robert Evon, Dwight Jerome, Lyle Linsemier, Thomas Purkey, Charles Schwenner, Bradley Sneed, and Kenneth Wikgren, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Michigan Department of Agriculture; the Michigan Agricultural Experiment Station; Michigan State University, Cooperative Extension Service; and Michigan Technological University

MARQUETTE COUNTY is in the north-central part of the Upper Peninsula of Michigan (fig. 1). It borders Lake Superior. It has an area of 1,198,912 acres, or about 1,873 square miles. The population of the county was 70,887 in 1990. Marquette, the county seat, had a population of 21,900 in 1990.

About 83 percent of the county is forested. Only about 2 percent is classified as farmland. Forestry, mining, and recreation are the major land uses.

About 250 different kinds of soil are in Marquette County. The soils vary widely in texture, natural drainage, slope, and other characteristics. Because of steep slopes, droughtiness, and rockiness, many of the soils are best suited to woodland. The subsoil in most of the moderately well drained soils has a restrictive layer that limits residential development and the use of forestry equipment. About 18 percent of the survey area consists of poorly drained mineral soils and very poorly drained organic soils.

General Nature of the County

This section provides general information about Marquette County. It describes history and development, climate, physiography, industry and transportation facilities, farming, lakes and streams, and recreation.

History and Development

The region on the southern shore of Lake Superior was little noticed by the earliest European explorers. Although it was part of the colonial territory claimed by France and later by England, no settlements were attempted. Only very small groups of Chippewa Indians appear to have utilized the region but apparently not on a permanent basis. The county was named in honor of the Jesuit priest Jacques Marquette. Marquette, an early explorer and missionary, probably camped in the area during his travels in the late 1600s. It is likely that the area was visited by Governor Lewis Cass in 1820 and by Henry Schoolcraft in 1832, but no records exist.

Figure 1.—Location of Marquette County in Michigan.

In 1836, a treaty made by the U.S. Government with the Chippewa Indians ceded land east of the Escanaba and Chocolay Rivers to the United States. In 1842, a similar treaty ceded the land west of that line. The formation of Marquette County was authorized in 1843 by an act of the Michigan Legislature when the entire Upper Peninsula of Michigan was divided into six counties. The first recorded observations of the county were made in 1844 by a government survey team sent to establish township lines and make geological observations. Headed by William Austin Burt, the team discovered iron deposits near present-day Negaunee. Within a year, the first mining operation, the Jackson Mining Company, was established to work these deposits. Another mining company, the Marquette Iron Company, was formed in 1849, and the settlement that developed around its operations became the city and port of Marquette. In 1850, the U.S. census found only 136 persons and 18 dwellings in the entire county. Nevertheless, the next year saw a county government established and the first election.

With the start of settlement and mining operations, transportation became of paramount importance. The difficulty of obtaining supplies, food, and mail added to the isolation experienced by the inhabitants during the winter months. In 1854, the first county road was opened. This road, between Negaunee and Marquette, allowed iron ore to be hauled to Lake Superior for loading on ships. Outgoing ore or incoming passengers and supplies had to be transferred to small boats until a wharf was built that same year.

Early mining operations were sporadic and ineffective until the Soo Locks were opened in 1855. In 1857, a new dock was built in Marquette that allowed ships to be loaded more quickly. That same year the Iron Mountain Railroad was completed between Ishpeming and Marquette. The railroad greatly increased the movement of ore. More rail lines were quickly added in the next few years.

In 1860, iron ore production was 100,000 tons and the county population was 2,821. Demand for ore increased greatly during the Civil War, and nearly 900,000 tons was being produced by 1870. This production accounted for 25 percent of the total U.S. output. The county had 35 mines in the 1870s, and about 80 percent of mining operations centered around Negaunee and Ishpeming. Mining activity had also started in Republic, Champion, Michigamme, and Humboldt.

By 1909, production had increased to 4.2 million tons of iron ore from 48 mines. The first modern concrete and steel ore dock was completed in 1912, and a similar one was added in 1931. By this time, however, the population of the county, which had peaked in 1910 at 46,076, started to decline. This decline was caused in large part by the decrease in ore production at Negaunee and Ishpeming, where large-scale mining had ended by 1929. The county has seen the mining-out of high grade ore, but new processes to concentrate low grade ore have kept the industry viable in the county.

The early mines and forges in the county quickly created a demand for pine lumber and hardwood charcoal. Rivers were used to float white pine logs to Lake Superior, where they were loaded on ships or rafted to sawmills, such as those at Big Bay. Clarksburg, Northland, and Mashek also were founded around the lumber industry. Because of second-growth forests and the demand for pulp, the wood industry is still an important element in the local economy.

With an increasing population during the mining era, agriculture also became important. Green Garden was the first agricultural center in the county. Yalmer, Skandia, and Carlshend also were established as farming communities. Dairy, livestock, small grain, hay, apples, and potatoes were the important crops. Many farms were settled under the Homestead Act, and their numbers increased until about the middle of the 1900s. Since then, a large decrease in farming has occurred; today, the contribution of farming to the local economy is minor.

Government had become an important employer in Marquette County by 1889, when the Upper Peninsula State Prison was built. The importance of government increased further when Northern State Normal School (now Northern Michigan University) opened in 1899. K.I. Sawyer Air Force Base, activated in 1956 near Gwinn, played an important role in national defense and was also a large employer until its closure in 1995.

Climate

The climate in the county is highly varied because of topographic diversity and the county's proximity to Lake Superior. These variations cause differences in the climate over distances of only a few miles.

Table 1 provides data on temperature and precipitation for the survey area as recorded at Van Riper State Park and Marquette in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 14.2 degrees F at Van Riper Park State and 20.9 degrees at Marquette. The average daily minimum temperature is 3.2 degrees at Van Riper State Park and 14.0 degrees at Marquette. The lowest temperature on record for Van Riper State Park is -44 degrees recorded on February 17, 1979, and the lowest temperature on record for Marquette is -24 degrees recorded on February 3, 1996.

In summer, the average temperature is 61.8 degrees at Van Riper State Park and 64 degrees at Marquette. The average daily maximum temperature is 76.2 degrees at Van Riper State Park and 73.2 degrees at Marquette. The highest recorded temperature at Van Riper State Park is 98 degrees recorded on July 28, 1988, and the highest temperature on record for Marquette is 104 degrees recorded on July 19, 1977.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 33.24 inches at Van Riper State Park and 30.02 inches at Marquette. Of these totals, between 8 and 9 inches, or about 30 percent, usually falls in June through August. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 4.41 inches at Van Riper State Park on September 2, 1957, and 4.06 inches at Marquette on October 24, 1959. Thunderstorms occur on about 29 days each year, and most occur between June and September.

The average seasonal snowfall is 129.7 inches at Van Riper State Park and 119.7 inches in downtown Marquette on the lakeshore. Across the county, the western upland areas that get the most lake-effect snow receive between 140 and 160 inches of snow annually, including around 150 inches at the Marquette airport. The annual snowfall decreases to the south and east, and approximately 80 to 100 inches falls in the extreme southern parts of the county. The greatest snow depth at any one time during the period of record was 60 inches at Van Riper State Park (recorded on February 14, 1996) and 41 inches at Marquette (recorded on March 14, 1997). At Van Riper State Park, on the average, 153 days of the year have at least 1 inch of snow on the ground. At Marquette, on the average, 135 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 25 inches at Van Riper State Park (recorded on February 12, 1965) and 17.3 inches at Marquette (recorded on March 14, 1997).

The average relative humidity in midafternoon is about 55 percent in May and nearly 75 percent in December. Humidity is higher at night, and the average at dawn is about 80 percent in most months and nearly 90 percent from June to September. The sun shines 60 percent of the time possible in summer and 34 percent in winter. The prevailing wind is from the northwest for much of the year, but it is from the south during the summer. Average windspeed is highest, around 10 miles per hour, in March and April.

Physiography

Prepared by Ken Wikgren, soil scientist, Natural Resources Conservation Service.

The topography of Marquette County is dominated by steep, Precambrian bedrock hills that in some areas occur alongside sharply contrasting sandstone benches. Much of the region is covered by glacial deposits ranging from hilly, bedrock-controlled moraines and steep, dissected sandy deposits to gently rolling ground moraines and nearly level outwash plains. Elevation ranges from 1,200 to more than 1,800 feet in the highlands. It is about 602 feet at the Lake Superior shoreline. The geology of the region has played a key role in determining the physiography, soils, and vegetation that together comprise the various ecosystems delineated on the landscape by this survey.

The bedrock of Marquette County consists of Precambrian, Cambrian, and Ordovician rocks (fig. 2). Correlation of the bedrock units and understanding the geologic history of this region are problematic, especially regarding the Precambrian. The Precambrian was a time of intense and repeated folding, faulting, metamorphism, mountain building, erosion, sedimentation, and subsidence. The igneous and metamorphic rocks now exposed can vary greatly over short distances, and many are obscured by glacial deposits, vegetation, and water. Basically, the Precambrian rocks are over 2.5 billion years old, are part of the Canadian Shield, and were uplifted to spectacular heights over 600 million years ago during the Penokean Orogeny near the end of the Precambrian. As these mountains were eroded, stream and lake sediments

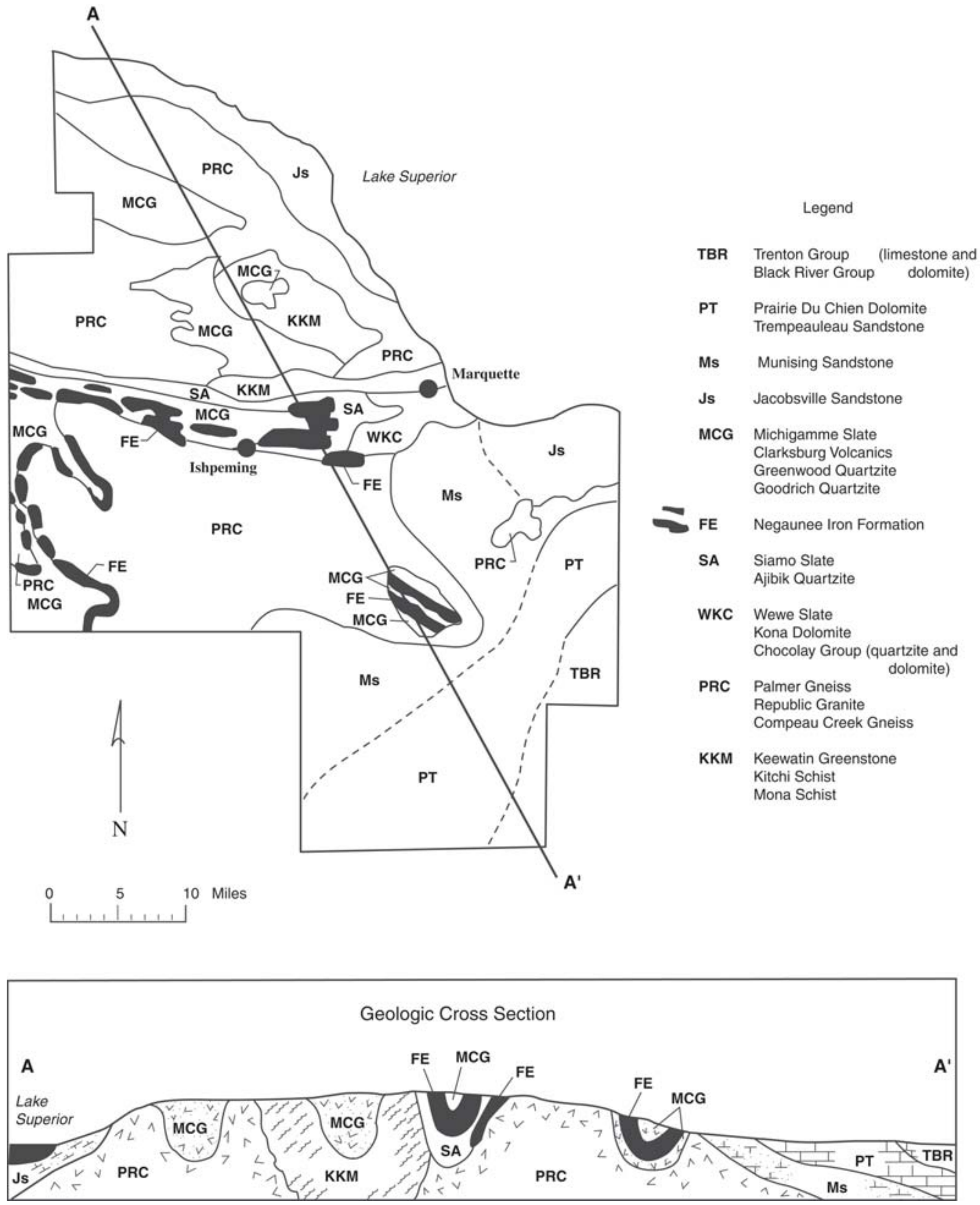


Figure 2.—Generalized cross section showing the bedrock geology of Marquette County. (Modified after Martin, 1936, and Kelley, 1968).

were deposited that led to the formation of the Jacobsville Sandstone. Later, in the Cambrian and into the Ordovician, Michigan was invaded by seas that led to marine sandstone, dolomite, and limestone formations (Dorr and Eschman, 1970).

The central and western parts of Marquette County are dominated by Precambrian igneous and metamorphic rock. The Keewatin rocks include the Kitchi and Mona Formations, consisting of schists and greenstones that, at nearly 3.5 billion years old, are among the oldest known rocks on earth. An outcrop of the Mona Formation can be seen in a roadcut along U.S. 41 about 7 miles west of Marquette. Rocks of Laurentian and/or Algoman age consist primarily of granite and gneiss. They include the Palmer and Republic Formations. A good example of Laurentian granite is at Sugarloaf

Mountain north of Marquette. Rock formations of the Early Huronian period include the Wewe Slate, the Kona Dolomite, and the Chocolay Group consisting of quartzite and dolomite. Outcrops of Kona Dolomite can be seen at Lindberg's Gravel Pits along CO 480. Algal structures found in the Kona provide evidence of simple plant life that existed 2 billion years ago. The Middle Huronian rocks include the Siamo Slate, Ajibik Quartzite, and Negaunee Iron Formation. An outcrop of Siamo Slate with bands of quartzite can be seen in a roadcut along U.S. 41 about 2.5 miles east of Negaunee. Rock formations of the Late Huronian include the Goodrich Quartzite, the Greenwood Quartzite, the Clarksburg Volcanics, and the Michigamme Formation, which consists of slate, graphitic slate, graywacke, schist, gneiss, and beds of iron ore known as the Bijiki Iron Formation.

The iron formations of the Middle and Late Huronian period are collectively known as the Marquette Range and include the mining locations around Negaunee, Ishpeming, National Mine, Humboldt, Champion, Michigamme, Republic, Palmer, and Gwinn. The iron formations consist of bands of silica and iron oxides, hematite, magnetite, limonite, jaspillite, and taconite interbedded with slate and chert. The iron mining industry has been and still is of great importance to the economy of the Upper Peninsula. The presence of iron formations has influenced the properties of the eroded sediments from these Precambrian rocks and is reflected in the Jacobsville Sandstone and the soils that formed in parent material derived from all of these rocks. Especially significant are the red color and high iron content of the soils and ground water throughout the region.

The Jacobsville Sandstone occurs at the unconformity between the Precambrian and Cambrian and is generally considered to be Early and Middle Cambrian in age. The Jacobsville Formation consists of a succession of red to white, coarse grained to fine grained, feldspathic and quartzose sandstone with layers of shale and conglomerate. Along the Lake Superior shore north of Marquette, at Presque Isle and Freeman's Landing, cliffs of Jacobsville Sandstone exhibit beautiful red and white streaks resulting from the oxidation, reduction, and leaching of iron. The Late Cambrian period is represented by the Munising Formation consisting of white and light gray, dolomitic and glauconitic sandstone and red, green, and gray shale. An outcrop of white Munising Sandstone can be seen at the south end of Stump Lake in Sec. 11, T. 45 N., R. 25 W. Rocks of Early Ordovician age consist primarily of dolomite and dolomitic sandstone. They include the Trempealeau Formation and the Prairie du Chien Group. The Middle Ordovician rocks are dominantly limestone, dolomite, and shale. They include the Black River and Trenton Groups. Good examples of fossiliferous dolomite and limestone can be seen along the Escanaba River in southern Marquette County; the younger rocks are visible as one travels south towards Boney Falls.

An ancient Precambrian mountain range bordered by a sequence of sedimentary rocks has led to the formation of the diverse topography and Lake Superior basin of today. Glacial ice and flowing water tend to choose the path of least resistance. Differential rates of erosion between hard and soft bedrock have helped to create a magnificent landscape featuring numerous islands, waterfalls, and cliffs.

During the Pleistocene Ice Age, the survey area was repeatedly covered by glacial ice. As the ice sheet moved generally from the north, it slid over the mountains and carved grooves and striations in the Precambrian bedrock on the up-ice sides and quarried dramatic rock escarpments on the down-ice sides. Huron Mountain in far northern Marquette County is an example of this rugged topography typical of many Precambrian bedrock hills throughout the region.

The glacial landforms and deposits of the region are the result of the last major glacial stage known as the Greatlakean (formerly Valderan) advance (see landform map). The sequence of events that occurred has not yet been deciphered with any degree of certainty. There probably were several glacial ice substages. Major ice lobes

were likely centered in the vicinity of Marquette to the east, Keweenaw Bay to the west, and the Huron Mountains to the north. There may have been others. The Huron Mountains acted as a major obstacle to the movement of the glacier. The ice advanced much faster over the sedimentary rocks to the west and east, greatly influencing the path of the lobes and leading to the formation of the current landscape, the Lake Superior and Lake Michigan shorelines, and the interlobate areas and may even have contributed to the formation of a "driftless" area hundreds of miles to the south. The Marquette Readvance of the ice sheet occurred approximately 10,000 years ago and may have been the last major advance (Farrand and Drexler, 1985). Minor local glaciation in the Huron Mountains may have occurred later in the Pleistocene and into the Holocene (Black, 1969).

The thickness of the glacial deposits ranges from 0 to more than 500 feet. The deposits include till, drainage channel deposits, outwash, lacustrine deposits, and eolian deposits. In some areas there is only a thin layer of basal till that closely reflects the bedrock over which the glacier passed. In other areas there may be several layers of glacial deposits representing a sequence of advances, ablation of ice, and proglacial activity (fig. 3).

The Marquette Lobe covered much of eastern and southeastern Marquette County. The relatively low relief inherent from the softer sedimentary bedrock allowed the glacier to impart a fluted pattern to the surface characterized by parallel grooves and intervening ridges grading into drumlins to the south and west. An example of a fluted ground moraine is in the area around Carlshend, and well formed drumlins can be seen southeast of Northland. The reddish brown loamy till becomes less red and more calcareous to the south as the bedrock influence changes from sandstone to dolomite and limestone.

In much of northwestern and central Marquette County, the landscape is determined by the topography of the Precambrian bedrock. These bedrock-controlled moraines are characterized by rock hills 50 to 500 feet high interlaced with glacial channels containing sandy and gravelly deposits, swamps, and small lakes. The rock outcrops commonly have talus slopes on the south faces and are strewn with boulders. Glacial deposits are relatively thin and vary greatly in thickness. The loamy or sandy till has a high content of rock fragments and tends to be brown over gneiss and granite, grayish brown over slate, and reddish brown over iron formations. Many areas have a silty or loamy eolian cap. Areas around Champion and Ishpeming are typical examples of this landform.

In southwestern and south-central Marquette County, there appears to be an interlobate area developed in the lee of the Huron Mountains. This is an area of disintegration moraines characterized by a chaotic mound and pit topography, closed depressions, and outwash deposits. Deposits include sandy or loamy till with a silty or loamy eolian cap and sandy or gravelly outwash. Surface stones and boulders are common. The area around Witch Lake is an example of this landform.

Eskers, crevasse fillings, kame terraces, kames, and kettles are ice-contact features that occur throughout the area of ablation on the disintegration moraines and are found on many of the other moraines as well. These features consist of stratified sandy and gravelly deposits, commonly grading into proglacial outwash. The outwash plains consist of broad, flat areas of sandy and gravelly deposits that in places grade into finer lacustrine sediments at the margin. Examples are the Yellow Dog Plains, Mulligan Plains, and Sands Plains.

The area between the uplands and Lake Superior has been strongly modified by glaciofluvial and glaciolacustrine activity, guided by the Precambrian bedrock and contrasting Jacobsville Sandstone to create a marvelously scenic and rugged landscape. As the ice front in the Huron Mountains melted back from its final advance, outlets were opened for glacial lakes Duluth and Agassiz, causing catastrophic flooding. As water from these huge lakes to the west poured east, various outlet

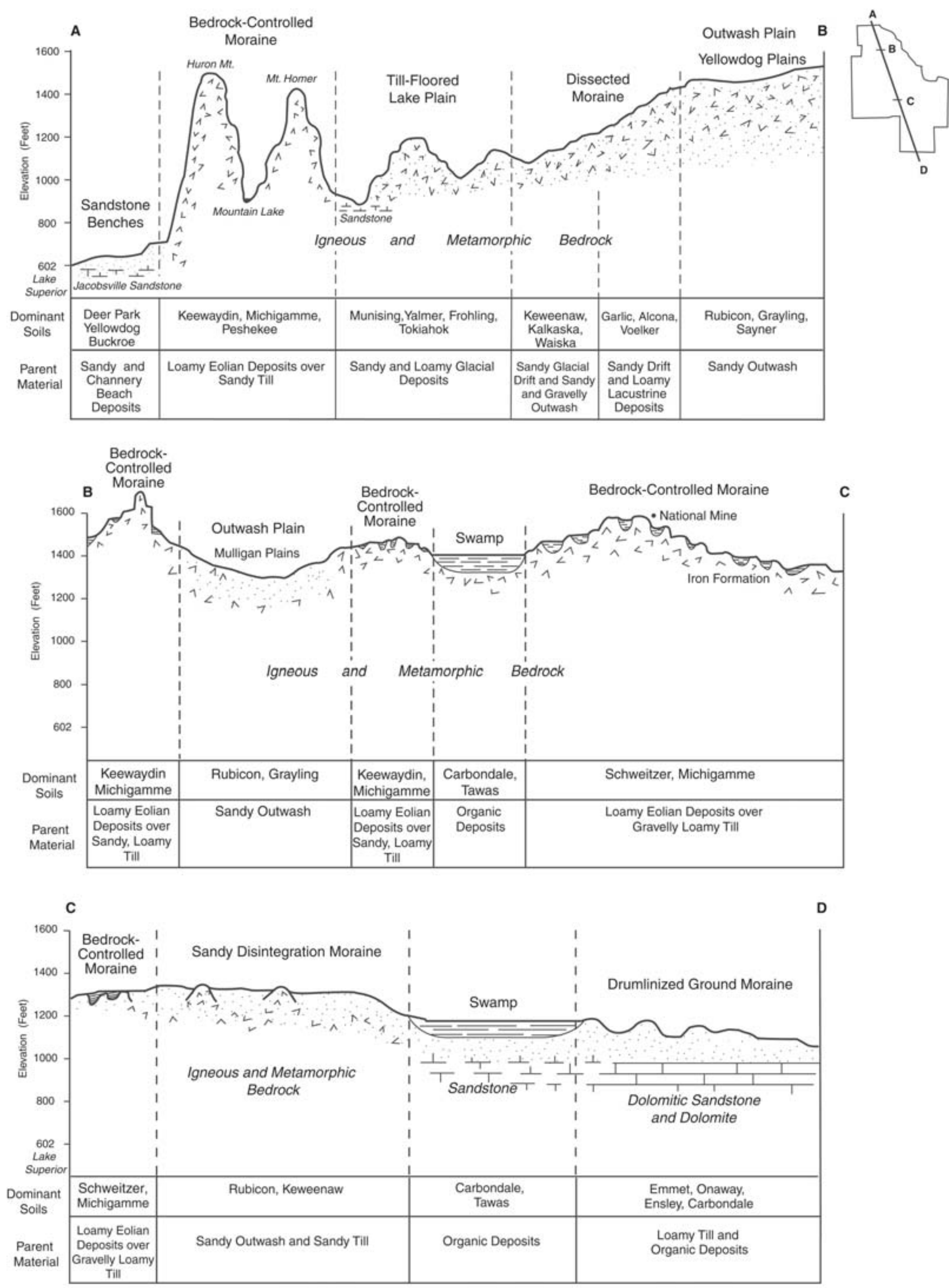


Figure 3.—Diagrammatic cross section of Marquette County showing the topography, dominant soils, elevation, landforms, parent material, and underlying bedrock. The dominant soils listed correspond with those on the general soil map. The landforms, bedrock geology, and parent material in the diagram correspond with those on the landform map and the generalized bedrock geology map.

channels were cut. The Cliff River gorge and Lake Ann basin were two of the channels. Bedrock benches were formed as flood waters scoured the Jacobsville Sandstone. Flood deposits left behind include the boulders south of Rush Lake and a 35-feet-high gravel bar between Lake Ann and Huron Mountain (Simpson and others, 1990).

The reddish brown sandy loam till deposited along Lake Superior strongly reflects the Jacobsville Sandstone. In some locations the Precambrian rocks added rock fragments to the till. As the glacier melted away, some of this material was washed and reworked by glacial meltwaters. Much of the area along CO 510 between Negaunee and Big Bay is a sandy, water-worked, bedrock-controlled moraine. Other areas were covered by deeper waters of glacial lakes. Much of the area along U.S. 41 between Harvey and Skandia is a till-floored lake plain. An example of a varved glaciolacustrine deposit can be seen in the southwest corner of Chocolay Township.

After the removal of the ice, the crust of the earth began to rebound. As the land rose, the water levels of the Great Lakes fluctuated as outlets changed. Once the outlets of the Great Lakes stabilized, around 6,000 years ago, the level of ancestral Lake Superior rose to the Nipissing level of 605 feet. Wave-cut cliffs and beaches of the former Nipissing shore are now at 640 feet as the isostatic rebound continues. Examples of Nipissing beaches and escarpments can be seen alongside the current Lake Superior beach at Wetmore Landing. Sandstone benches can be seen at Presque Isle and Big Bay Point.

After the ice age ended, numerous lakes and streams have remained as remnants of glacial erosion, ablation, and drainage. Synclinal bedrock structure, with the younger, less resistant bedrock in the basin, influenced the subsequent glacial activity to form Lake Superior and Lake Michigamme. Some of the lake basins, such as that of Mountain Lake, were gouged out of the bedrock by glacial ice. Others, such as Rush Lake, were deepened by catastrophic flood waters. Conway Lake, Saux Head Lake, and Lake Independence are former lagoons of Lake Nipissing that were uplifted by rebound and cut off from Lake Superior by beaches. Some lake basins were filled by large blocks of ice, which melted out to form the current lake. Ives Lake is an example of an ice-block lake. The major rivers and even minor streams once drained great volumes of glacial meltwater, as evidenced by the large canyons, rocky gorges, and impressive terraces. The Yellow Dog, Peshekee, Escanaba, and Chocolay Rivers, for example, are now confined to smaller channels and include areas ranging from bedrock gorges and waterfalls to small flood plains and marshes.

In postglacial times, erosion and deposition continued to modify the landscape. Rock faces were once again exposed as they were stripped of sediment. Smooth slopes of glacial deposits were dissected by drainageways. Shorelines were modified by waves and currents. Eroded silts and sands were deposited, dried, blown by the wind, and redeposited. Alluvial soils were deposited on flood plains, and organic deposits formed in swamps. Small, shallow lakes filled with vegetation and became bogs. In time, as vegetation began to stabilize the soil, the various ecosystems of today began to form, reflecting the complex physiography of Marquette County.

Landform Descriptions

The following paragraphs describe the characteristics of some of the major landforms depicted on the landform map. The map was prepared by Jamie Antoniewicz, soil scientist, Natural Resources Conservation Service.

Bedrock-controlled ground moraine (glacial channels).—This landform occurs as a moderately sloping to very steep, bedrock-controlled moraine covered by sandy or loamy till of variable thickness. The till generally has a high content of rock fragments, and it may have a silty or loamy eolian cap. Topography is controlled by bedrock features; rock outcrops are common. In some areas the rock outcrops are closely spaced and locally dominate the landform. In other areas the rock outcrops are spaced farther apart or are more subdued. This landform is interlaced with outwash channels containing sandy and gravelly soils.

The soils in areas of this landform are characterized by a loamy or silty mantle over sandy or loamy till. They typically have a high content of rock fragments. Surface stones and boulders are common throughout the landform.

Bedrock types include gneiss, schist, granite, and slate. Iron formations of iron oxides and hematite occur locally. Two small areas of this landform occur on the Alger County border where the bedrock is Jacobsville Sandstone.

Bedrock-controlled ground moraine (sandy drift dominant).—This landform occurs as a moderately sloping to very steep moraine of predominantly sandy drift deposited over and around surface bedrock features. Topography is controlled by bedrock features. Small areas of loamy till, sandy and gravelly outwash, and organic soils are included.

The sandy soils in areas of this landform vary greatly in content of rock fragments. The soils can be unstratified till or stratified glaciofluvial deposits. Surface stones and boulders occur randomly and in varying densities throughout the landform.

Bedrock types include gneiss, schist, granite, slate, and greenstone. Iron formations occur locally.

Disintegration moraine (eolian cap).—This landform occurs as a gently rolling to very steep series of moraines of sandy and loamy till. A silty or loamy eolian cap covers more than 90 percent of the landform. This landform is characterized by a chaotic mound and pit topography, generally randomly oriented, with many enclosed depressions.

The soils in areas of this landform are characterized by a silty or loamy mantle over sandy or loamy till. They typically have a high content of rock fragments. Surface stones and boulders occur throughout the landform.

Bedrock types include gneiss, schist, granite, slate, and graywacke. Iron formations occur locally in thin bands.

Outwash plain.—This landform occurs as a nearly level to moderately sloping area of sands and gravels deposited by glacial meltwater. The area may or may not have a loamy mantle. Areas of outwash are generally flat, uniform landforms, but areas of pitted outwash also occur in the county.

Granite and gneiss bedrock outcrops occur in some areas of this landform.

Sandy disintegration moraine.—This landform occurs as a gently rolling to very hilly system of moraines consisting of sandy glacial drift. The landform is characterized by a chaotic mound and pit topography, generally randomly oriented, with enclosed depressions. Small or medium sized areas of sandy or gravelly outwash also are included. Some areas that have an abundance of surface rock fragments occur locally.

The sandy soils in areas of this landform vary greatly in content of rock fragments. A thin loamy mantle, generally less than 10 inches thick, occurs randomly throughout the landform. Abrupt changes between materials of differing lithology are common.

Drumlinized ground moraine.—This landform occurs as a moderately sloping to steep till plain characterized by numerous, roughly parallel, elongated oval hills of compact, calcareous, loamy till, which are generally oriented in a northeast/southwest direction. Areas of sandy and gravelly outwash soils in the form of eskers or channels of outwash along with large areas of organic soils occur between the drumlins.

Limestone, dolomite, and dolomitic sandstone bedrock breaks the surface intermittently in areas of this landform, particularly along rivers and creeks.

The predominantly loamy soils in areas of this landform are characterized by an acid to neutral solum 20 to 40 inches thick over calcareous loamy till. The soils generally have a low or moderate content of rock fragments. Small areas of soils that are shallow and moderately deep to bedrock occur on the flats.

Fluted ground moraine.—This landform occurs as a nearly level to moderately sloping till plain consisting of predominantly calcareous, loamy till. Small areas of outwash and sandy till are included. The gently rolling parallel grooves and ridges of this landform are generally oriented in a north/south direction, and organic soils and ponded areas are in the depressions and drainageways. Acidic loamy till occurs in the western and northern parts of this landform.

This landform is underlain by limestone, dolomite, and dolomitic sandstone bedrock. The bedrock crops out at the surface locally.

Deep and very deep, loamy soils are dominant in areas of this landform. Small or medium sized areas of soils that are shallow and moderately deep to bedrock also occur.

Till-floored lake plain.—This landform occurs as gently undulating to very hilly areas of sandy and loamy till and lacustrine deposits intermixed with sandy glaciofluvial deposits. The landform was formed when sand, silt, and till deposits were reworked by glacial meltwaters of variable speed and volume. Most of this landform was once covered by glacial lake water and then was exposed when the water level was lowered or the elevation of the land was raised. Wave action of the glacial lake waters along with other glaciofluvial processes resulted in the mixing and reworking of existing glacial drift deposits. This “water-working” action created a landform where soils and surface textures are variable within short distances.

The soils in areas of this landform range from sandy to silty. Stratified and varved glaciolacustrine soils of widely varying textures are a common component. Narrow or moderately wide channels of sandy and gravelly soils occur within this landform. The content of rock fragments in the soils varies widely. Generally, the soils that have a high content of rock fragments occur closer to Lake Superior. As the distance from the lake increases, the content of rock fragments in the soil decreases.

Dissected moraine.—This landform occurs as hilly to very steep dissected uplands of sandy and loamy drift characterized by a dendritic ravine pattern and the presence of ephemeral streams.

The dominant soils in areas of this landform are acidic, sandy and loamy drift. Silty and gravelly soils also occur. The soils typically have a low or moderate content of rock fragments. Surface stones and boulders occur in some parts of the landform but not in others.

Beach ridges and dunes.—This landform occurs as nearly level to strongly sloping, sandy lake deposits on dunes and beach ridges. The ridges are roughly parallel to the shoreline, representing successive positions of an advancing shoreline. Much of this landform exhibits a ridge-and-swale topography of wet and dry, sandy soils.

The sandy soils in areas of this landform typically have no rock fragments or have only a low content of rock fragments. Small, scattered gravelly spots also occur.

Sandstone benches.—This landform occurs as nearly level to very steep deposits of sandy and loamy drift and residual soils that are shallow or moderately deep over sandstone bedrock. Most of this landform has been covered by glacial lake water. Sandstone rock outcrops occur in some areas.

Glaciolacustrine and glaciofluvial processes have greatly influenced the soils. Some soils have a high content of rock fragments, and others are relatively free of rock fragments. Stratified soils of water-worked drift over bedrock are common. Small areas of deep, loamy and gravelly soils are included. Surface stones are common throughout most of the landform.

Red and brown Jacobsville Sandstone dominates this landform. Small areas of shale and conglomerate rock also are included.

Swamp.—This landform occurs as level or nearly level areas of shallow to deep organic deposits over outwash or till. Small areas of well drained high ground too small to map separately occur within these swamps. There are scattered outcroppings of bedrock.

Ground moraine.—This landform occurs as a nearly level to moderately sloping till plain consisting predominantly of calcareous, loamy till and areas of sandy and gravelly outwash. Medium sized and large areas of continuous swamp occur within this landform. Areas of soils that are shallow and moderately deep to bedrock occur on structural benches within the ground moraine.

The predominantly loamy soils in areas of this landform are characterized by an acid solum 30 to 40 inches thick over calcareous loamy till. The soils generally have a low to moderate content of rock fragments.

This landform is underlain by limestone, dolomite, and dolomitic sandstone bedrock, which influences the soil characteristics. The bedrock breaks the surface intermittently, particularly along creeks and rivers.

Industry and Transportation Facilities

Government, services, retail trade, iron mining, timber harvesting, and tourism are the major sources of employment in Marquette County. Prior to its closure in 1995, K.I. Sawyer Air Force Base was the predominant government employer. The Empire and Tilden iron mines are now the leading source of employment in the county. Health care (Marquette General Hospital, Bell Memorial Hospital, and Marquette Medical-Dental Center) and Northern Michigan University are the major service sector employers.

The main roads in the county are U.S. Highway 41 and State Highways M-28, M-94, M-35, and M-95. Two freight-only railroads service the county, and Marquette County Airport provides regularly scheduled passenger service.

Farming

Agriculture is a relatively small industry in Marquette County. Farms make up about 26,624 acres, or 2.3 percent of the total acreage in the county. Major crops produced include grass and mixed hay, alfalfa, potatoes, barley, oats, and corn for grain and silage. The 1997 agricultural census counted 108 farms averaging 247 acres; only 6 farms were larger than 500 acres. The total acreage in cropland is 12,378 acres on 90 farms. The remaining farmland consists of woodland, wetland, and homesteads. In 1997, Marquette County had 2,556 cattle and calves, including 772 milk cows and 568 beef cows.

In the early years, small farming was common in the settled regions of Marquette County. These farms provided meat, dairy, and various grains, fruits, and vegetable products to the lumber and mining concerns scattered throughout the area. Over time, many of these farms have reverted to woodland or have been converted to recreational areas or hobby farms.

Agricultural production in Marquette County is limited because of the short, cool growing season, the distance to markets, the scarcity of productive soils, and the limited local markets.

Dairy, potatoes, and beef production are the most stable farming enterprises in Marquette County. Hay production for the pleasure horse market also is an ongoing enterprise. There are some small, specialized livestock and crop production businesses for the regional market. Because of the long period of idleness or minimal inputs on cropland, many sites in Marquette County are suitable for conversion to organic production practices.

Lakes and Streams

Marquette County has 1,755 natural lakes. Lake Michigamme and Lake Independence are the largest, covering 4,360 and 1,860 acres, respectively. There are also 69 manmade lakes, ponds, and hydroelectric reservoirs. The Dead River storage Basin is the largest, covering about 2,102 acres. In addition, there are 55 miles of Lake Superior shoreline.

Approximately 1,416 miles of rivers and streams flow within the county. The Michigamme, Escanaba, Yellow Dog, Dead, Chocolay, Peshekee, and Black Rivers are the major rivers. The Chocolay, Dead, and Yellow Dog Rivers flow into Lake Superior,

and the Black, Escanaba, Michigamme, and Peshekee Rivers flow south into Lake Michigan. There are more than 20 waterfalls in the county.

Recreation

Opportunities for recreational activities abound in Marquette County. The rugged hills, vigorous forests, the numerous lakes, rivers, and waterfalls, the abundant snowfall, and the extensive Lake Superior shoreline provide an ideal setting for a variety of outdoor activities. Many residents and tourists enjoy sightseeing, hiking, camping, canoeing, kayaking, swimming, mountain biking, fishing, hunting, cross-country skiing, snowshoeing, snowmobiling, and ATV riding. Areas open to public recreation include thousands of acres of State forest, National forest, and commercial forest reserve lands. Streams in the region are famous for trout, and Lake Superior is legendary for lake trout, salmon, and steelhead. Hunting, especially for small game and white-tailed deer, is very popular. Excellent facilities are available for camping and golfing, and the county has numerous resorts, marinas, outfitters, and ski centers.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of

soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area may not fully agree with those of the soils in adjacent survey areas. Differences are the result of an improved knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" (USDA/NRCS) and the "Soil Survey Manual" (Soil Survey Division Staff, 1993) of the Natural Resources Conservation Service.

The soil survey maps made for conservation planning prior to the start of the project, including the published soil survey maps and interpretations for the Marquette-Humboldt area (1977) and for the Chocolay area (1975), were among the references used. Previously made soil maps were field checked, revised, and incorporated into this project. Other references include bedrock and glacial geology maps, which were studied and used to plan mapping strategy.

Before the actual fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on 1:20,000 leaf-off aerial photography. Soil scientists used U.S. Geological Survey topographic maps at a scale of 1:24,000 to relate land and image features.

A reconnaissance was made by vehicle before the soil scientists traversed the surface on foot and examined the soils. In areas where the soil pattern is very complex, traverses and random observations were spaced as close as 200 yards. In areas where the soil pattern is relatively simple, traverses were about $^1/_4$ mile apart.

As they traversed the surface, the soil scientists divided the landscape into segments. For example, a hillside would be separated from a swale or a gently sloping ridgetop from a very steep side slope. Observations of such items as landforms, blown-down trees, vegetation, roadbanks, excavated pits, and rock outcrops were

made without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation. The soil material was examined with the aid of a hand auger or a spade to a depth of about 5 feet. The pedons described as typical were observed and studied in pits that were dug with shovels, mattocks, and digging bars or excavated with a backhoe.

Each year of the project, notes were taken on the composition of map units. These notes were supplemented with transects and additional soil investigations as mapping progressed and the composition of individual map units was determined for the soil survey area.

Samples for chemical and physical analyses were taken from representative sites of some soils in the survey area. The analyses were made by the National Soil Survey Laboratory, Lincoln, Nebraska. The results of the analyses are stored in a computerized data file at the laboratory. The results of the analyses and descriptions of the laboratory procedures can be obtained by request.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to another set of photographs. The mapping was transferred to two different scales of photographs. Map sheets 16 through 38 and map sheets 40 through 69 (see Index to Map Sheets) were compiled at a scale of 1:12,000. The remaining map sheets were compiled at a scale of 1:24,000. The areas that were transferred to 1:12,000 photos coincide with the area that currently has the most intensive land use in the county. These areas also are anticipated to be subject to the most intense pressure for development in the near future. The goal of transferring the mapping to larger scale photographs in this area was to show more detail and allow smaller map unit delineations in the areas where future development is anticipated. Cultural features were recorded from observations of the maps and the landscape.

The National Cooperative Soil Survey is a system of site classification for multiple-use resource management based primarily on soils. The soil survey of Marquette County, however, has integrated a number of additional factors into its classification of land and forest sites. The multi-factor approach to site classification is based on the interrelationship between vegetation, physiography, and soils.

In the process of making this soil survey, a considerable amount of time was spent in the field by trained personnel observing and recording data about the soils, vegetation, and physiography of Marquette County. Soils data were collected and analyzed as outlined elsewhere in this section and in the Soil Properties section of this report.

Vegetative data were collected on the overstory, understory, and ground cover on forested sites. Key indicator plants were used to identify the habitat type according to the Habitat Type Classification System explained in the Forest Habitat Types section of this report. The physiography was studied and landforms were identified based on the bedrock and glacial geology as described in the Physiography section of this report.

The information gathered and reviewed is utilized to develop units that can be delineated on maps and accurately described. The goal is to provide several levels of land units that are visible to the land user and relatively permanent in endurance and usefulness. For broad base planning, the general soil map and geology maps can be used, but these are limited by scale and the complexity of the survey area. At the more intense detailed soil map level, the multi-factor approach becomes more practical.

Marquette County has a diverse and complex variety of forest communities, landforms, and soil types. It is possible to identify a tremendous number of map units. In making this soil survey, the project members have worked to correlate these units into what should be useful delineations. These units are distinguished on the basis of such factors as landform, rockiness, stoniness, and potential forest productivity as well as soil classification.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These broad areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Buckroe-Yalmer Association

Shallow and very deep, nearly level to very steep, excessively drained and moderately well drained, sandy soils; on sandstone benches

Setting

Landform: Sandstone benches
Slope range: 0 to 70 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association (fig. 4):
Buckroe and similar soils—60 percent
Yalmer and similar soils—30 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Buckroe
Depth class: Shallow to sandstone
Drainage class: Excessively drained
Parent material: Sandy beach deposits over sandstone bedrock
Texture of the surface layer: Very channery loamy sand
Slope: Nearly level to very steep

Yalmer
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Sandy mantle over loamy till
Texture of the surface layer: Fine sand
Slope: Nearly level to rolling

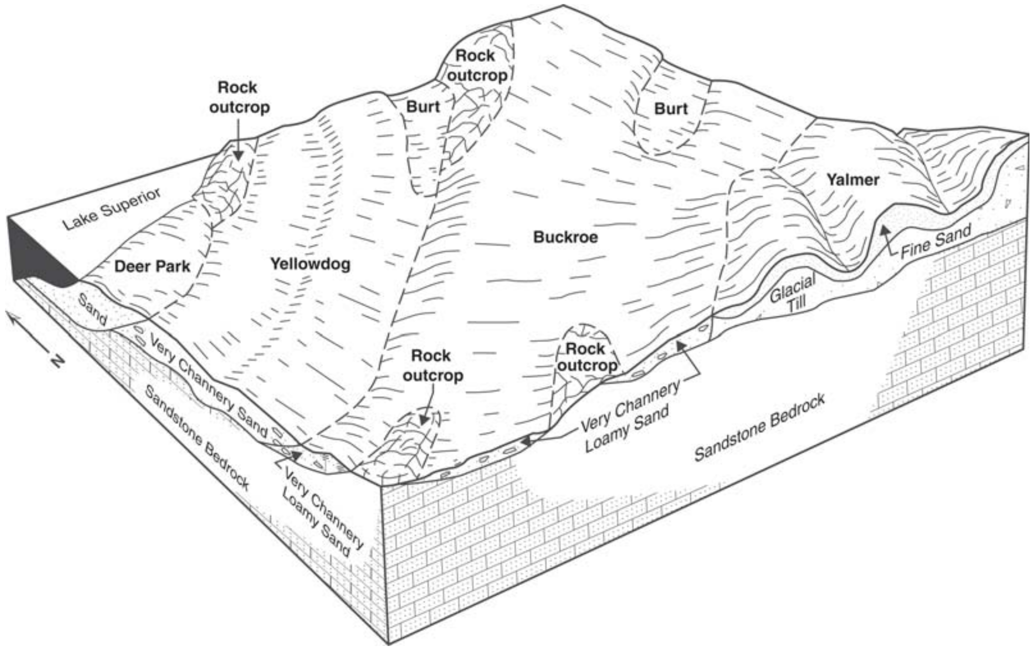


Figure 4.—Typical pattern of soils and parent material in the Buckroe-Yalmer association.

Soils of Minor Extent

- Deer Park and Waiska soils on knolls and ridges
- Burt and Carbondale soils in depressions and drainageways
- Yellowdog soils and areas of rock outcrop in landscape positions similar to those of the Buckroe soils

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Building roads on the contour, installing water bars and culverts, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be needed in very hilly areas.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Such harvest methods as selective cutting can reduce the windthrow hazard.
- Site preparation helps to control plant competition.

2. Zeba-Jacobsville Association

Moderately deep, nearly level, somewhat poorly drained and poorly drained, loamy soils; on sandstone benches

Setting

Landform: Sandstone benches
Slope range: 0 to 3 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Zeba and similar soils—50 percent
Jacobsville and similar soils—20 percent
Soils of minor extent—30 percent

Soil Properties and Qualities

Zeba
Depth class: Moderately deep to sandstone
Drainage class: Somewhat poorly drained
Parent material: Loamy till over sandstone
Texture of the surface layer: Cobbly fine sandy loam
Slope: Nearly level

Jacobsville
Depth class: Moderately deep to sandstone
Drainage class: Poorly drained
Parent material: Loamy till over sandstone
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Burt, Carbondale, Gay, Greenwood, and Skandia soils in landscape positions similar to those of the Jacobsville soils
- Waiska soils in gently undulating areas
- Skanee soils in landscape positions similar to those of the Zeba soils

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- Access is easiest during the winter. Year-round logging roads require a gravel base.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Harvest methods that do not leave the remaining trees widely spaced reduce the windthrow hazard.

3. Cunard-Nahma Association

Moderately deep, nearly level and gently undulating, well drained and poorly drained, loamy soils; on dolomitic benches

Setting

Landform: Dolomitic benches
Slope range: 0 to 6 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Cunard and similar soils—55 percent
Nahma and similar soils—25 percent
Soils of minor extent—20 percent

Soil Properties and Qualities

Cunard
Depth class: Moderately deep to dolomitic sandstone, dolomite, or limestone
Drainage class: Well drained
Parent material: Loamy till over dolomite, dolomitic sandstone, or limestone
Texture of the surface layer: Fine sandy loam
Slope: Gently undulating

Nahma
Depth class: Moderately deep to dolomitic sandstone, dolomite, or limestone
Drainage class: Poorly drained
Parent material: Loamy till over dolomite, dolomitic sandstone, or limestone
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Carbondale, Cathro, and Ensley soils in depressions and drainageways
- Emmet, Shoepac, and Reade soils on knolls and ridges

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- The seasonal high water table in areas of the Nahma soils restricts the use of equipment to midsummer or winter.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Nahma soils.
- Harvest methods that do not leave the remaining trees widely spaced reduce the windthrow hazard.

4. Keewaydin-Michigamme-Rock Outcrop Association

Rock outcrop and very deep and moderately deep, nearly level to very hilly, well drained soils; on bedrock-controlled moraines

Setting

Landform: Bedrock-controlled moraines
Slope range: 1 to 70 percent

Composition

Extent of the association: 21 percent of the survey area
Extent of the components in the association (fig. 5):
Keewaydin and similar soils—45 percent
Michigamme and similar soils—20 percent
Rock outcrop—10 percent
Soils of minor extent—25 percent

Soil Properties and Qualities

Keewaydin
Depth class: Very deep
Drainage class: Well drained
Parent material: Loamy and silty eolian deposits over gravelly and sandy till

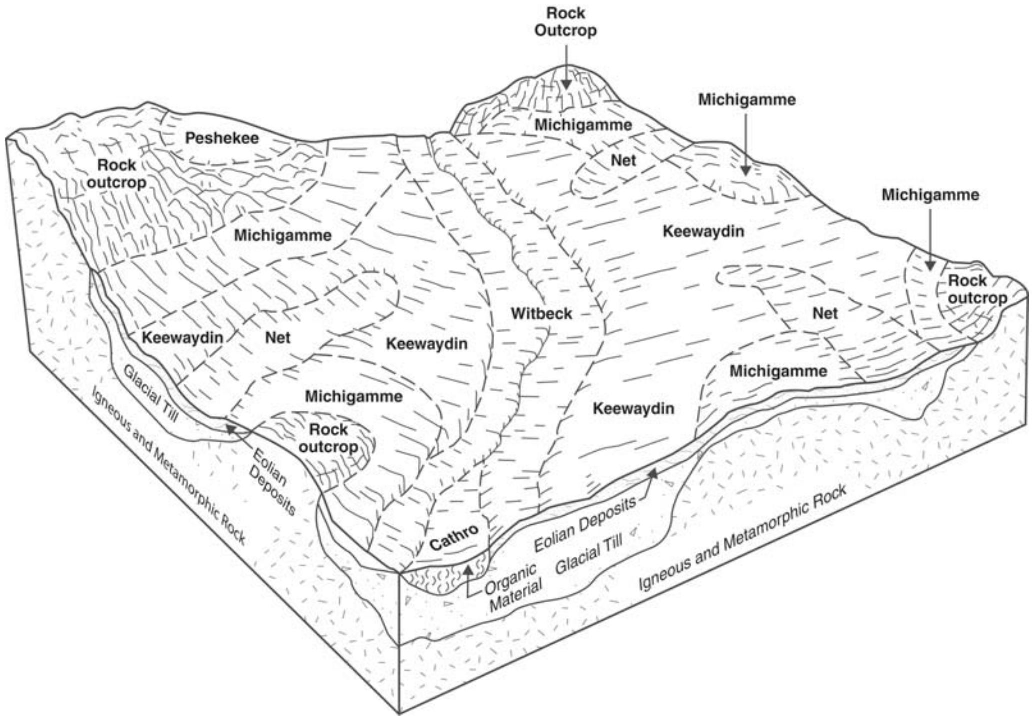


Figure 5.—Typical pattern of soils and parent material in the Keewaydin-Michigamme-Rock outcrop association.

Texture of the surface layer: Cobbly fine sandy loam
Slope: Nearly level to very hilly

Michigamme
Depth class: Moderately deep to igneous or metamorphic bedrock
Drainage class: Well drained
Parent material: Silty or loamy mantle over loamy till overlying igneous or metamorphic bedrock
Texture of the surface layer: Cobbly fine sandy loam
Slope: Gently rolling to very hilly

Soils of Minor Extent

- Carbondale, Cathro, Net, and Witbeck soils in depressions and drainageways
- Champion, Dishno, Peshekee, and Sundog soils in landscape positions similar to those of the major soils

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and plant competition
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be necessary in the very hilly areas.
- Selective cutting can reduce the windthrow hazard.
- Site preparation helps to control plant competition.

5. Schweitzer-Michigamme-Rock Outcrop Association

Rock outcrop and very deep and moderately deep, gently rolling to very hilly, well drained, loamy soils; on bedrock-controlled moraines

Setting

Landform: Bedrock-controlled moraines
Slope range: 6 to 70 percent

Composition

Extent of the association: 4 percent of the survey area
Extent of the components in the association:
Schweitzer and similar soils—40 percent
Michigamme and similar soils—20 percent
Rock outcrop—10 percent
Soils of minor extent—30 percent

Soil Properties and Qualities

Schweitzer
Depth class: Very deep
Drainage class: Well drained
Parent material: Silty or loamy eolian deposits over loamy and sandy till
Texture of the surface layer: Cobbly very fine sandy loam
Slope: Gently rolling to very hilly

Michigamme
Depth class: Moderately deep to igneous or metamorphic bedrock
Drainage class: Well drained
Parent material: Silty or loamy mantle over loamy till overlying igneous or metamorphic bedrock
Texture of the surface layer: Cobbly fine sandy loam
Slope: Gently rolling to very hilly

Soils of Minor Extent

- Kalkaska, Pence, and Peshekee soils in landscape positions similar to those of the major soils
- Carbondale, Cathro, and Pleine soils in depressions and drainageways
- Gogebic soils in nearly level to rolling areas

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, windthrow hazard, and plant competition
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be necessary in the very hilly areas.
- Such harvest methods as selective cutting can reduce the windthrow hazard.
- Site preparation helps to control plant competition.

6. Pits-Dumps, Mine-Slickens Association

Setting

Landform: Bedrock-controlled moraines
Slope range: 0 to 70 percent

Composition

Extent of the association: 2 percent of the survey area
Extent of the components in the association (fig. 6):
Pits and Dumps, mine—70 percent
Slickens—20 percent
Components of minor extent—10 percent

Components of Minor Extent

- Keewaydin, Michigamme, and Peshekee soils on knolls and ridges
- Udorthents and Udipsamments on dikes of slickens basins
- Rock outcrop and water

Use and Management

Major uses: Active and inactive open-pit iron mines
Management concerns: Onsite investigation is needed to determine the suitability for specific uses.

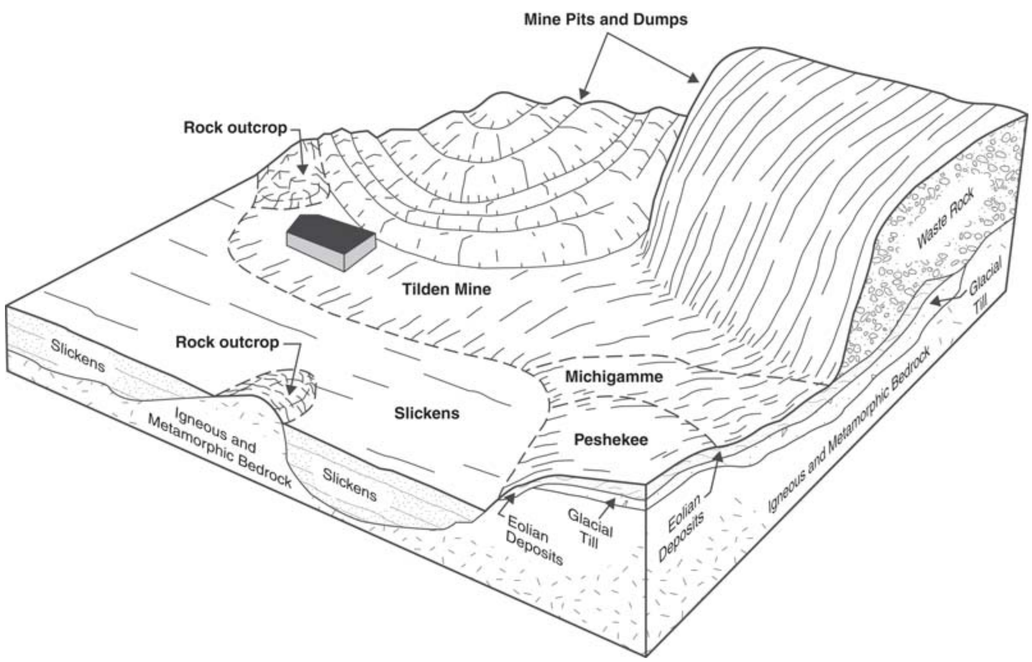


Figure 6.—Typical pattern of components and underlying material in the Pits-Dumps, mine-Slickens association.

7. Kalkaska-Ishpeming-Rock Outcrop Association

Rock outcrop and very deep and moderately deep, gently rolling to very hilly, somewhat excessively drained, sandy soils; on bedrock-controlled moraines

Setting

Landform: Bedrock-controlled moraines
Slope range: 6 to 70 percent

Composition

Extent of the association: 5 percent of the survey area
Extent of the components in the association:
Kalkaska and similar soils—55 percent
Ishpeming and similar soils—20 percent
Rock outcrop—10 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Kalkaska
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Gently rolling to very hilly

Ishpeming
Depth class: Moderately deep to igneous or metamorphic bedrock
Drainage class: Somewhat excessively drained
Parent material: Sandy till or glaciofluvial deposits over igneous or metamorphic bedrock
Texture of the surface layer: Sand
Slope: Gently rolling to very hilly

Soils of Minor Extent

- Carbondale and Tawas soils in depressions and drainageways
- Keweenaw, Pelissier, Rubicon, Sayner, and Waiska soils in landscape positions similar to those of the Kalkaska and Ishpeming soils

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and seedling mortality
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be necessary in the very hilly areas.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

8. Deer Park Association

Very deep, nearly level to rolling, excessively drained, sandy soils; on beach ridges and dunes

Setting

Landform: Beach ridges and dunes
Slope range: 1 to 18 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Deer Park and similar soils—85 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Deer Park
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy beach deposits
Texture of the surface layer: Sand
Slope: Nearly level to rolling

Soils of Minor Extent

- Deford, Greenwood, and Tawas soils in depressions and drainageways
- Croswell soils in the slightly lower positions on the landscape
- Rubicon soils in landscape positions similar to those of the Deer Park soils

Use and Management

Major use: Woodland
Management concerns: Equipment limitations and seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

9. Rubicon-Sayner Association

Very deep, nearly level to very hilly, excessively drained, sandy soils; on outwash plains and outwash terraces

Setting

Landform: Outwash plains and outwash terraces
Slope range: 0 to 70 percent

Composition

Extent of the association: 6 percent of the survey area
Extent of the soils in the association:
Rubicon and similar soils—65 percent

Sayner and similar soils—20 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Rubicon
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Nearly level to very hilly

Sayner
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy and gravelly outwash
Texture of the surface layer: Loamy sand
Slope: Gently undulating to very hilly

Soils of Minor Extent

- Grayling, Ocqueoc, and Rousseau soils in landscape positions similar to those of the major soils
- Greenwood and Tawas soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and seedling mortality
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be necessary in the very hilly areas.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

10. Grayling Association

Very deep, nearly level to very hilly, excessively drained, sandy soils; on outwash plains

Setting

Landform: Outwash plains
Slope range: 0 to 35 percent

Composition

Extent of the association: 3 percent of the survey area
Extent of the soils in the association:
Grayling soils—90 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Grayling
Depth class: Very deep

Drainage class: Excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Nearly level to very hilly

Soils of Minor Extent

- Pelissier, Rubicon, and Sayner soils in landscape positions similar to those of the Grayling soils
- Croswell soils in the slightly lower positions on the landscape
- Kinross soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and seedling mortality
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be necessary in the very hilly areas.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

11. Kalkaska-Carbondale-Deford Association

Very deep, nearly level to very hilly, somewhat excessively drained, very poorly drained, and poorly drained, sandy and mucky soils; on outwash plains and outwash terraces

Setting

Landform: Outwash plains and outwash terraces
Slope range: 0 to 35 percent

Composition

Extent of the association: 6 percent of the survey area
Extent of the soils in the association:
Kalkaska and similar soils—30 percent
Carbondale and similar soils—25 percent
Deford and similar soils—25 percent
Soils of minor extent—20 percent

Soil Properties and Qualities

Kalkaska
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Nearly level to very hilly

Carbondale
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits

Texture of the surface layer: Muck
Slope: Nearly level

Deford
Depth class: Very deep
Drainage class: Poorly drained
Parent material: Sandy outwash
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Keweenaw, Rousseau, and Rubicon soils in landscape positions similar to those of the Kalkaska soils
- Au Gres, Croswell, and Paquin soils in nearly level and gently undulating areas
- Evart and Greenwood soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Access is easiest during the winter. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Carbondale and Deford soils.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate in areas of the Kalkaska soils.
- Harvest methods that do not leave the remaining trees widely spaced can reduce the windthrow hazard.

12. Pence Association

Very deep, nearly level to very hilly, somewhat excessively drained, sandy soils; on outwash plains and outwash terraces

Setting

Landform: Outwash plains and outwash terraces
Slope range: 0 to 35 percent

Composition

Extent of the association: 3 percent of the survey area
Extent of the soils in the association:
Pence and similar soils—85 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Pence
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material: Loamy mantle over sandy outwash

Texture of the surface layer: Fine sandy loam
Slope: Nearly level to very hilly

Soils of Minor Extent

- Gogebic, Rubicon, Sayner, and Sundog soils in landscape positions similar to those of the Pence soils
- Carbondale and Greenwood soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard and equipment limitations
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- Special care is needed in laying out logging roads and operating logging equipment in the very hilly areas. The grade should be kept as low as possible.

13. Sundog-Minocqua-Channing Association

Very deep, nearly level to very hilly, well drained, poorly drained, and somewhat poorly drained, loamy soils; on outwash plains and outwash terraces

Setting

Landform: Outwash plains and outwash terraces
Slope range: 0 to 35 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association (fig. 7):
Sundog and similar soils—30 percent
Minocqua and similar soils—25 percent
Channing and similar soils—25 percent
Components of minor extent—20 percent

Soil Properties and Qualities

Sundog
Depth class: Very deep
Drainage class: Well drained
Parent material: Silty or loamy mantle over sandy and gravelly outwash
Texture of the surface layer: Silt loam
Slope: Nearly level to very hilly

Minocqua
Depth class: Very deep
Drainage class: Poorly drained
Parent material: Loamy deposits overlying stratified sandy and gravelly outwash
Texture of the surface layer: Muck
Slope: Nearly level

Channing
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material: Loamy deposits overlying stratified sandy and gravelly outwash

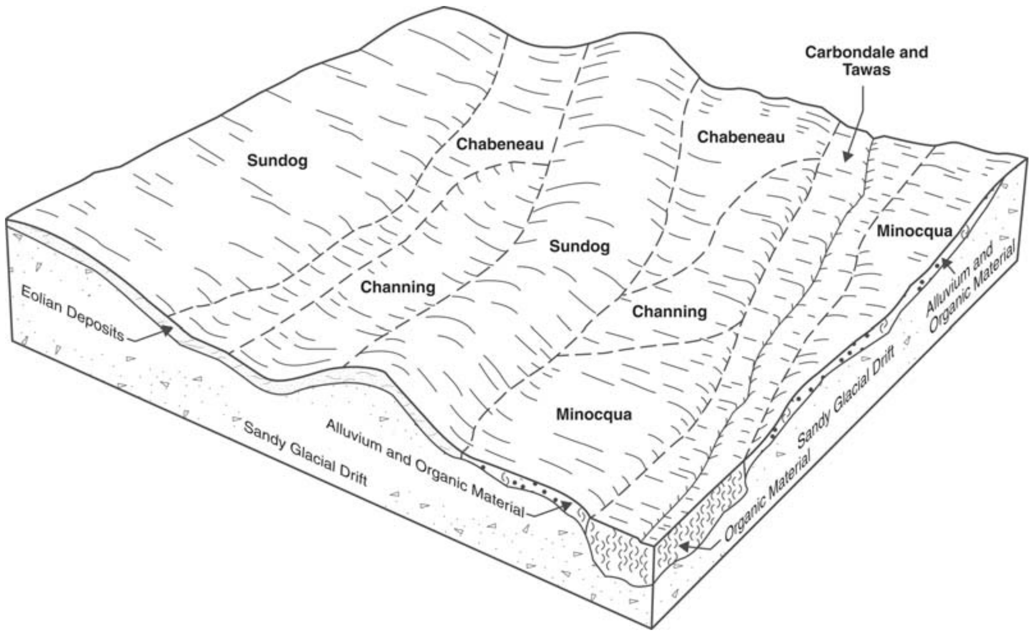


Figure 7.—Typical pattern of soils and parent material in the Sundog-Minocqua-Channing association.

Texture of the surface layer: Fine sandy loam
Slope: Nearly level

Components of Minor Extent

- Pelissier and Pence soils in landscape positions similar to those of the Sundog soils
- Chabeneau soils in landscape positions between those of the Sundog and Channing soils
- Carbondale and Tawas soils in depressions and drainageways
- Areas of rock outcrop

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- Building roads on the contour, installing water bars, and seeding logging roads help to prevent excessive soil loss.
- The seasonal high water table in areas of the Minocqua and Channing soils restricts the use of equipment to midsummer, when the soils are dry, or midwinter, when there is adequate snow cover. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Special care is needed in laying out logging roads and operating logging equipment in the very hilly areas of the Sundog soils. The grade should be kept as low as possible.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Minocqua and Channing soils.

- Harvest methods that do not leave the remaining trees widely spaced reduce the windthrow hazard in areas of the Minocqua and Channing soils.

14. Rubicon-Keweenaw Association

Very deep, gently undulating to very hilly, excessively drained and well drained, sandy soils; on disintegration moraines

Setting

Landform: Disintegration moraines
Slope range: 1 to 45 percent

Composition

Extent of the association: 5 percent of the survey area
Extent of the soils in the association:
Rubicon and similar soils—55 percent
Keweenaw and similar soils—35 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Rubicon
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Gently undulating to very hilly

Keweenaw
Depth class: Very deep
Drainage class: Well drained
Parent material: Sandy till
Texture of the surface layer: Cobbly loamy sand
Slope: Gently undulating to very hilly

Soils of Minor Extent

- Sayner soils in landscape positions similar to those of the major soils
- Croswell soils in nearly level areas
- Carbondale, Deford, and Greenwood soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and plant competition
Management considerations:
- Building logging roads on the contour, installing water bars and culverts, and seeding logging roads help to prevent excessive soil loss in the very hilly areas.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Special care is needed in laying out logging roads and operating logging equipment in the very hilly areas. The grade should be kept as low as possible.
- Site preparation helps to control plant competition.

15. Goodman-Sundog-Greenwood Association

Very deep, nearly level to very hilly, well drained, loamy soils and very poorly drained, peaty soils; on disintegration moraines

Setting

Landform: Disintegration moraines
Slope range: 0 to 45 percent

Composition

Extent of the association: 6 percent of the survey area
Extent of the soils in the association (fig. 8):
Goodman and similar soils—45 percent
Sundog and similar soils—35 percent
Greenwood and similar soils—10 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Goodman
Depth class: Very deep
Drainage class: Well drained
Parent material: Silty mantle over sandy till
Texture of the surface layer: Silt loam
Slope: Gently undulating to very hilly

Sundog
Depth class: Very deep
Drainage class: Well drained
Parent material: Silty or loamy mantle over sandy and gravelly outwash
Texture of the surface layer: Silt loam
Slope: Gently undulating to very hilly

Greenwood
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits
Texture of the surface layer: Peat
Slope: Nearly level

Soils of Minor Extent

- Keewaydin soils in landscape positions similar to those of the Goodman and Sundog soils
- Wabeno soils in nearly level to gently sloping areas
- Cathro, Tawas, and Witbeck soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, and plant competition
Management considerations:
- Building logging roads on the contour, installing water bars and culverts, and seeding logging roads help to prevent excessive soil loss in the very hilly areas.
- Special care is needed in laying out logging roads and operating logging equipment in the very hilly areas. The grade should be kept as low as possible.
- Such harvest methods as selective cutting can reduce the seedling mortality rate.

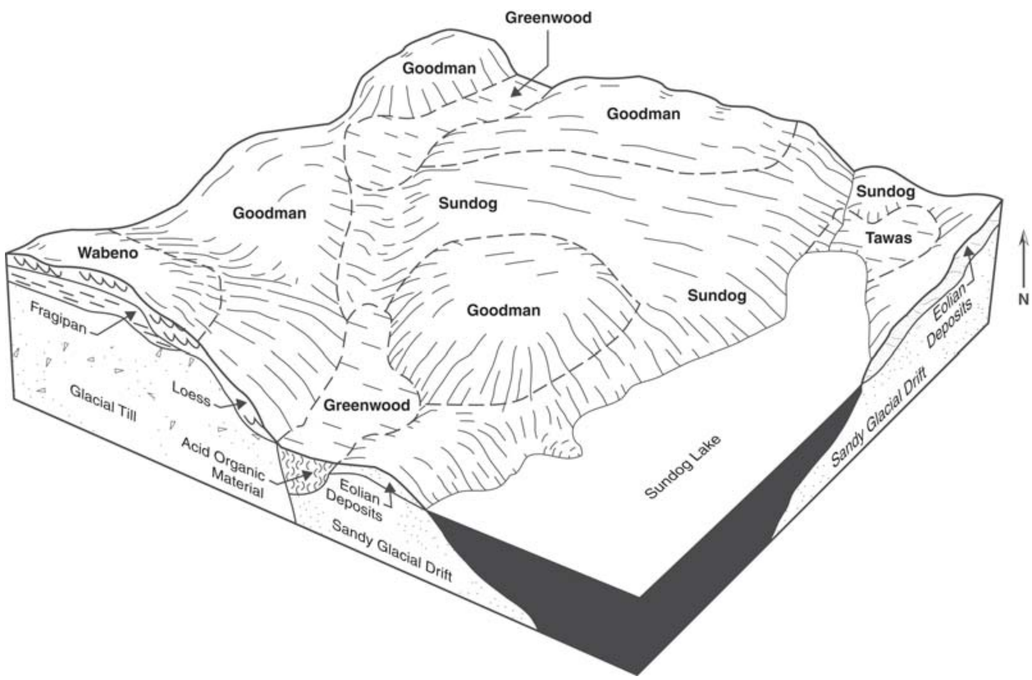


Figure 8.—Typical pattern of soils and parent material in the Goodman-Sundog-Greenwood association.

- Because of extreme acidity and wetness, the Greenwood soils are generally unsuited to woodland.

16. Sagola-Rubicon Association

Very deep, gently undulating to very hilly, well drained and excessively drained, loamy and sandy soils; on disintegration moraines

Setting

Landform: Disintegration moraines
Slope range: 1 to 18 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Sagola and similar soils—55 percent
Rubicon and similar soils—30 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Sagola
Depth class: Very deep
Drainage class: Well drained
Parent material: Loamy till
Texture of the surface layer: Fine sandy loam
Slope: Gently undulating to very hilly

Rubicon
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Gently undulating to very hilly

Soils of Minor Extent

- Pelissier soils in landscape positions similar to those of the major soils
- Carbondale soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, and plant competition
Management considerations:
- Year-round logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate in areas of the Rubicon soils.
- Site preparation helps to control plant competition.

17. Carbondale-Tawas Association

Very deep, nearly level, very poorly drained, mucky soils; in swamps on lake plains, outwash plains, and moraines

Setting

Landform: Swamps on lake plains, outwash plains, and moraines
Slope range: 0 to 1 percent

Composition

Extent of the association: 2 percent of the survey area
Extent of the soils in the association:
Carbondale and similar soils—50 percent
Tawas and similar soils—30 percent
Soils of minor extent—20 percent

Soil Properties and Qualities

Carbondale
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits
Texture of the surface layer: Muck
Slope: Nearly level

Tawas
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits over sandy outwash
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Au Gres, Croswell, and Deford soils in the slightly higher positions on the landscape
- Rubicon and Kalkaska soils on knolls and ridges

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- Access is easiest in winter, when the soils are frozen or have adequate snow cover.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

18. Shoepac-Ensley-Charlevoix Association

Very deep, nearly level and gently undulating, moderately well drained, poorly drained, and somewhat poorly drained, loamy soils; on fluted ground moraines

Setting

Landform: Fluted ground moraines
Slope range: 0 to 6 percent

Composition

Extent of the association: 5 percent of the survey area
Extent of the soils in the association:
Shoepac and similar soils—55 percent
Ensley and similar soils—20 percent
Charlevoix and similar soils—15 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Shoepac
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Loamy till
Texture of the surface layer: Silt loam
Slope: Gently undulating

Ensley
Depth class: Very deep
Drainage class: Poorly drained
Parent material: Loamy till
Texture of the surface layer: Muck
Slope: Nearly level

Charlevoix
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material: Loamy till
Texture of the surface layer: Silt loam
Slope: Nearly level

Soils of Minor Extent

- Escanaba and Trenary soils in gently rolling and rolling areas
- Cathro and Nahma soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to summer, when the soils are dry, or midwinter, when the soils are frozen or have adequate snow cover.
- Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Because of wetness and plant competition, trees are generally not planted on the Ensley and Charlevoix soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

19. Shoepac-Carbondale Association

Very deep, nearly level and gently undulating, moderately well drained and very poorly drained, loamy and mucky soils; on fluted ground moraines

Setting

Landform: Fluted ground moraines
Slope range: 0 to 6 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Shoepac and similar soils—60 percent
Carbondale and similar soils—30 percent
Soils of minor extent—10 percent

Soil Properties and Qualities

Shoepac
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Loamy till
Texture of the surface layer: Silt loam
Slope: Gently undulating

Carbondale
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Trenary soils in gently rolling and rolling areas
- Cathro, Ensley, and Nahma soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- In areas of the Carbondale soils, access is easiest during the winter, when the soils are frozen or have adequate snow cover.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Because of wetness and plant competition, trees are generally not planted on the Carbondale soils.
- Harvest methods that do not leave the remaining trees widely spaced can reduce the windthrow hazard.

20. Emmet-Carbondale Association

Very deep, nearly level to steep, well drained and very poorly drained, loamy and mucky soils; on drumlinized ground moraines

Setting

Landform: Drumlinized ground moraines
Slope range: 0 to 35 percent

Composition

Extent of the association: 10 percent of the survey area
Extent of the soils in the association (fig. 9):
Emmet and similar soils—35 percent
Carbondale and similar soils—35 percent
Soils of minor extent—30 percent

Soil Properties and Qualities

Emmet
Depth class: Very deep
Drainage class: Well drained
Parent material: Loamy till
Texture of the surface layer: Fine sandy loam
Slope: Gently undulating to steep

Carbondale
Depth class: Very deep
Drainage class: Very poorly drained
Parent material: Organic deposits
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Escanaba, Nadeau, and Onaway soils in landscape positions similar to those of the Emmet soils
- Cathro, Ensley, and Solona soils in depressions and drainageways

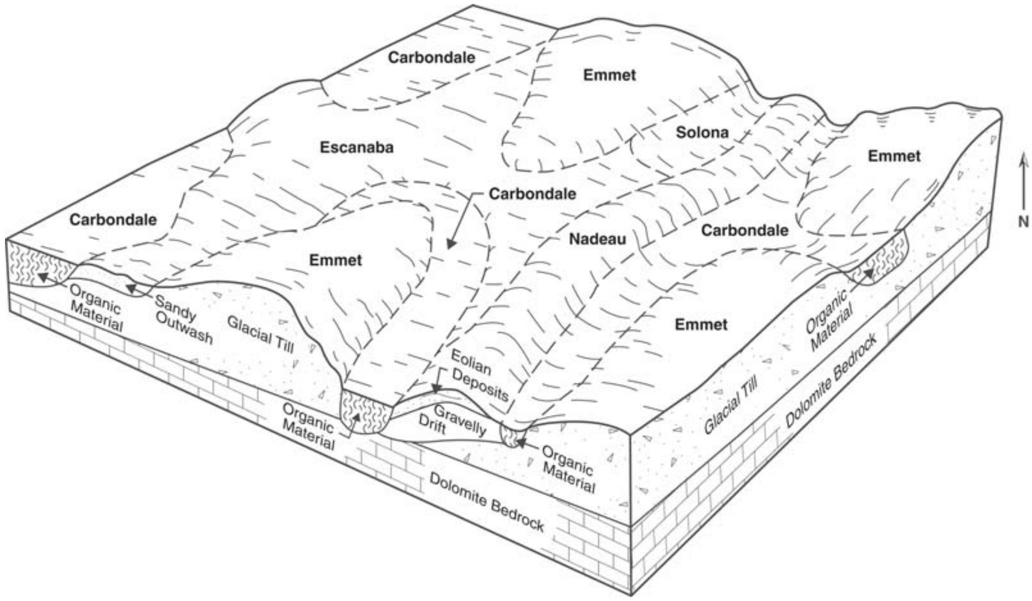


Figure 9.—Typical pattern of soils and parent material in the Emmet-Carbondale association.

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:

- Building roads on the contour, installing water bars and culverts, and seeding logging roads help to prevent soil loss in steep areas of the Emmet soils.
- Special care is needed in laying out logging roads and operating logging equipment in the very hilly areas. The grade should be kept as low as possible.
- Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- In areas of the Carbondale soils, access is easiest during the winter, when the soils are frozen or have adequate snow cover.
- Because of wetness and plant competition, trees are generally not planted on the Carbondale soils.
- Harvest methods that do not leave the remaining trees widely spaced can reduce the windthrow hazard in areas of the Carbondale soils.

21. Munising-Fence-Paquin Association

Very deep, nearly level to moderately sloping, moderately well drained, loamy, silty, and sandy soils; on dissected moraines and till-floored lake plains

Setting

Landform: Dissected moraines and till-floored lake plains
Slope range: 0 to 12 percent

Composition

Extent of the association: 1 percent of the survey area
Extent of the soils in the association:
Munising and similar soils—40 percent

Fence and similar soils—30 percent
Paquin and similar soils—15 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Munising
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Loamy till
Texture of the surface layer: Fine sandy loam
Slope: Nearly level to moderately sloping

Fence
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Stratified loamy deposits
Texture of the surface layer: Very fine sandy loam
Slope: Gently undulating

Paquin
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Nearly level

Soils of Minor Extent

- Frohling soils in very hilly to steep areas
- Carbondale, Cathro, Ensley, and Skanee soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, windthrow hazard, and plant competition
Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing culverts and water bars. Skidders should not be used during periods when ruts form easily. Year-round logging roads require a gravel base.
- Selective cutting can reduce the windthrow hazard.
- Site preparation helps to control plant competition.

22. Munising-Yalmer Association

Very deep, nearly level to gently sloping, moderately well drained, loamy and sandy soils; on till-floored lake plains

Setting

Landform: Till-floored lake plains
Slope range: 1 to 12 percent

Composition

Extent of the association: 2 percent of the survey area
Extent of the soils in the association:
Munising and similar soils—40 percent

Yalmer and similar soils—30 percent
Soils of minor extent—30 percent

Soil Properties and Qualities

Munising
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Loamy till
Texture of the surface layer: Fine sandy loam
Slope: Nearly level to gently sloping

Yalmer
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Sandy mantle over loamy till
Texture of the surface layer: Fine sand
Slope: Nearly level to gently sloping

Soils of Minor Extent

- Frohling and Tokiahok soils in very hilly areas
- Kalkaska and Waiska soils in landscape positions similar to those of the major soils
- Carbondale, Gay, and Skanee soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, windthrow hazard, and plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing culverts and water bars. Skidders should not be used during periods when ruts form easily. Year-round logging roads require a gravel base.
- Selective cutting can reduce the windthrow hazard.
- Site preparation helps to control plant competition.

23. Skanee-Munising-Gay Association

Very deep, nearly level to rolling, somewhat poorly drained, moderately well drained, and poorly drained, loamy soils; on till-floored lake plains and ground moraines

Setting

Landform: Till-floored lake plains and ground moraines
Slope range: 0 to 18 percent

Composition

Extent of the association: 6 percent of the survey area
Extent of the soils in the association (fig. 10):
Skanee and similar soils—40 percent
Munising and similar soils—30 percent
Gay and similar soils—15 percent
Soils of minor extent—15 percent

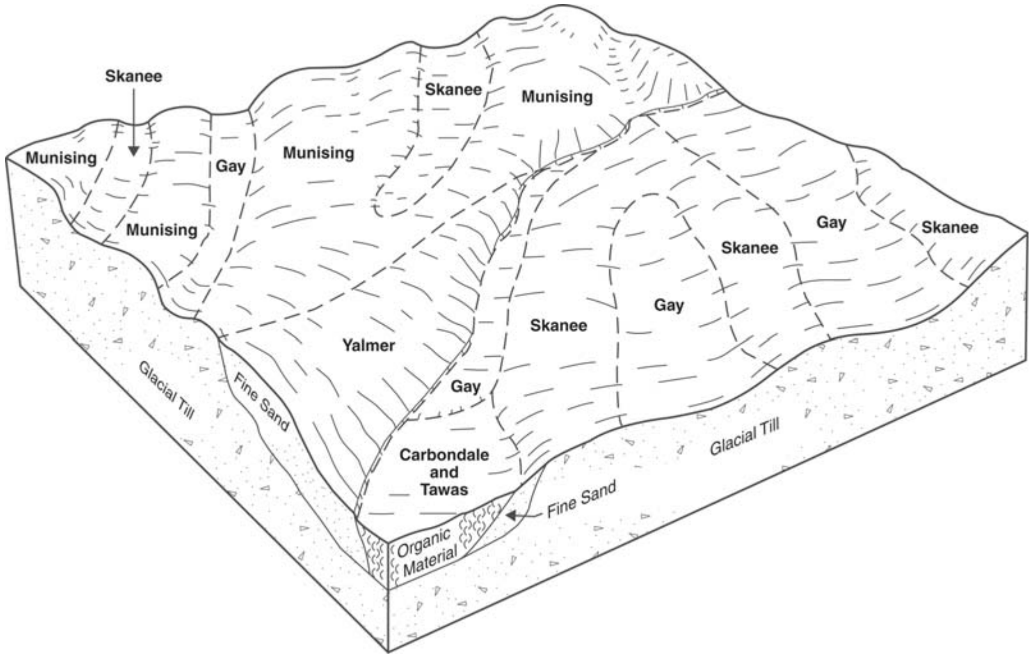


Figure 10.—Typical pattern of soils and parent material in the Skanee-Munising-Gay association.

Soil Properties and Qualities

Skanee
Depth class: Very deep
Drainage class: Somewhat poorly drained
Parent material: Loamy till
Texture of the surface layer: Cobbly fine sandy loam
Slope: Nearly level

Munising
Depth class: Very deep
Drainage class: Moderately well drained
Parent material: Loamy till
Texture of the surface layer: Fine sandy loam
Slope: Gently undulating to rolling

Gay
Depth class: Very deep
Drainage class: Poorly drained
Parent material: Loamy till
Texture of the surface layer: Muck
Slope: Nearly level

Soils of Minor Extent

- Carbondale and Tawas soils in depressions and drainageways
- Yalmer soils in landscape positions similar to those of the Munising soils

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, and plant competition
Management considerations:
- In areas of the Munising soils, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Access is easiest during the winter, when the soils are frozen or have adequate snow cover. Year-round roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Trees are generally not planted on the Skanee and Gay soils because of wetness and plant competition.
- Selective cutting can reduce the windthrow hazard.

24. Keweenaw-Kalkaska-Waiska Association

Very deep, moderately sloping to very steep, well drained, somewhat excessively drained, and excessively drained, sandy soils; on dissected moraines and till-floored lake plains

Setting

Landform: Dissected moraines and till-floored lake plains
Slope range: 8 to 70 percent

Composition

Extent of the association: 2 percent of the survey area
Extent of the soils in the association:
Keweenaw and similar soils—40 percent
Kalkaska and similar soils—30 percent
Waiska and similar soils—15 percent
Soils of minor extent—15 percent

Soil Properties and Qualities

Keweenaw
Depth class: Very deep
Drainage class: Well drained
Parent material: Sandy till
Texture of the surface layer: Loamy sand
Slope: Moderately sloping to very steep

Kalkaska
Depth class: Very deep
Drainage class: Somewhat excessively drained
Parent material: Sandy outwash
Texture of the surface layer: Sand
Slope: Moderately sloping to very steep

Waiska
Depth class: Very deep
Drainage class: Excessively drained
Parent material: Sandy and gravelly outwash
Texture of the surface layer: Cobbly loamy sand
Slope: Moderately sloping to very steep

Soils of Minor Extent

- Munising and Yalmer soils in nearly level to moderately sloping areas
- Paquin soils in nearly level and gently undulating areas
- Deford and Tawas soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, and plant competition
Management considerations:
- Skid trails and roads should be located in the less sloping areas between ravines.
- Seeding logging roads helps to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be needed in the very steep areas.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Site preparation helps to control plant competition.

25. Garlic-Alcona-Voelker Association

Very deep, moderately sloping to very steep, well drained, sandy and loamy soils; on dissected moraines and till-floored lake plains

Setting

Landform: Dissected moraines and till-floored lake plains
Slope range: 8 to 70 percent

Composition

Extent of the association: 4 percent of the survey area
Extent of the soils in the association:
Garlic and similar soils—50 percent
Alcona and similar soils—15 percent
Voelker and similar soils—15 percent
Soils of minor extent—20 percent

Soil Properties and Qualities

Garlic
Depth class: Very deep
Drainage class: Well drained
Parent material: Sandy glaciofluvial sediments
Texture of the surface layer: Fine sand
Slope: Moderately sloping to very steep

Alcona
Depth class: Very deep
Drainage class: Well drained
Parent material: Stratified sandy and loamy glaciolacustrine deposits
Texture of the surface layer: Loamy very fine sand
Slope: Moderately sloping to very steep

Voelker
Depth class: Very deep
Drainage class: Well drained
Parent material: Sandy outwash over loamy glaciolacustrine deposits

Texture of the surface layer: Fine sand
Slope: Moderately sloping to very steep

Soils of Minor Extent

- Frohling, Keweenaw, and Tokiahok soils in landscape positions similar to those of the major soils
- Fence and Yalmer soils in nearly level to moderately sloping areas
- Carbondale and Tawas soils in depressions and drainageways

Use and Management

Major use: Woodland
Management concerns: Erosion hazard, equipment limitations, seedling mortality, and plant competition
Management considerations:
- Skid trails should be located in the less sloping areas between ravines.
- Seeding logging roads helps to prevent excessive soil loss.
- Special logging methods, such as yarding with a cable, may be needed in the very steep areas.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Site preparation helps to control plant competition.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Munising fine sandy loam, 1 to 6 percent slopes, is a phase of the Munising series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Emmet-Escanaba complex, 1 to 6 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Histosols and Aquents, ponded, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits and Dumps, mine (map unit 64), is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

10B—Grayling sand, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash plains
Shape of areas: Irregular
Size of areas: 25 to 1,000 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray sand
Subsoil:
3 to 23 inches—brown and strong brown sand
Substratum:
23 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Grayling soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross soils in depressions and drainageways
- The moderately well drained Croswell soils in the slightly lower positions on the landscape

Similar components:
- Soils that have a substratum of gravelly sand
- Soils that are darker in the upper part of the subsoil
- Soils that are fine sand throughout

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

10D—Grayling sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash plains
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray sand
Subsoil:
3 to 23 inches—brown and strong brown sand
Substratum:
23 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low

Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Grayling soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross soils in depressions and drainageways
- The moderately well drained Croswell soils in the lower positions on the landscape

Similar components:
- Soils that are fine sand throughout
- Soils that are darker in the upper part of the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

10E—Grayling sand, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash plains
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray sand
Subsoil:
3 to 23 inches—brown and strong brown sand
Substratum:
23 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Grayling soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross soils in depressions and drainageways
- The moderately well drained Croswell soils in the lower positions on the landscape

Similar components:
- Soils that are fine sand throughout
- Soils that are darker in the upper part of the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Slope

Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

11C—Deer Park sand, 1 to 10 percent slopes

Setting

Landform: Nearly level to gently sloping areas on beach ridges and dunes
Distinctive landscape features: Beach ridges
Shape of areas: Elongated
Size of areas: 4 to 450 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—very dark gray sand
Subsurface layer:
3 to 11 inches—pale brown sand
Subsoil:
11 to 28 inches—strong brown and brown sand
Substratum:
28 to 80 inches—pale brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Deer Park soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross soils in depressions and drainageways
- The moderately well drained Croswell soils in the slightly lower positions on the landscape
- Areas of dunes and beaches adjacent to Lake Superior

Similar components:
- Soils that have a substratum of gravelly sand
- Soils that have a darker brown subsoil and support different vegetative cover

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

11D—Deer Park sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on beach ridges and dunes
Distinctive landscape features: Beach ridges
Shape of areas: Elongated
Size of areas: 6 to 40 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—very dark gray sand
Subsurface layer:
3 to 11 inches—pale brown sand
Subsoil:
11 to 28 inches—strong brown and brown sand
Substratum:
28 to 80 inches—pale brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained

Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Deer Park soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross soils in depressions and drainageways
- The moderately well drained Croswell soils in the lower positions on the landscape

Similar components:
- Soils that have a darker brown subsoil and support different vegetative cover

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

12B—Rubicon sand, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash plains, beach ridges, and outwash terraces
Shape of areas: Irregular
Size of areas: 5 to 1,000 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Pelissier soils in landscape positions similar to those of the Rubicon soil

Similar components:
- Soils that are fine sand throughout
- Soils that have a loamy substratum
- Soils that have a seasonal high water table at a depth of 50 to 80 inches

Use and Management

Woodland (fig. 11)
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity

Figure 11.—A stand of jack pine in an area of Rubicon sand, 0 to 6 percent slopes. The area in the foreground has recently been clearcut. This forest management practice is commonly used for jack pine regeneration.

Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

12D—Rubicon sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash plains, beach ridges, and outwash terraces
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand

Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Pelissier soils in landscape positions similar to those of the Rubicon soil

Similar components:
- Soils that are fine sand throughout
- Soils that have a loamy substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope

Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

12E—Rubicon sand, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash plains and outwash terraces
Shape of areas: Irregular
Size of areas: 7 to 60 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Pelissier soils in landscape positions similar to those of the Rubicon soil

Similar components:
- Soils that are fine sand throughout
- Soils that have a loamy substratum
- Soils that are gravelly sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality

Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

12F—Rubicon sand, 35 to 70 percent slopes

Setting

Landform: Very steep areas on outwash plains and outwash terraces
Shape of areas: Irregular
Size of areas: 15 to 75 acres

Typical Profile

Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford soils in depressions and drainageways
- The excessively drained Pelissier soils in landscape positions similar to those of the Rubicon soil

Similar components:
- Soils that are fine sand throughout
- Soils that have a loamy substratum
- Soils that are gravelly sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

13B—Kalkaska sand, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash terraces, outwash plains, and moraines
Shape of areas: Irregular
Size of areas: 15 to 550 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Kalkaska soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Paquin and Yalmer soils in landscape positions similar to those of the Kalkaska soil
- The excessively drained Waiska soils in landscape positions similar to those of the Kalkaska soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are fine sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

13D—Kalkaska sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces, outwash plains, and moraines
Shape of areas: Irregular
Size of areas: 20 to 150 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Kalkaska soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Yalmer soils in landscape positions similar to those of the Kalkaska soil
- The excessively drained Waiska soils in landscape positions similar to those of the Kalkaska soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are fine sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

13E—Kalkaska sand, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash terraces, outwash plains, and moraines
Shape of areas: Irregular
Size of areas: 5 to 25 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Kalkaska soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Tokiahok soils in landscape positions similar to those of the Kalkaska soil
- The excessively drained Waiska soils in landscape positions similar to those of the Kalkaska soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are fine sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

13F—Kalkaska sand, 35 to 70 percent slopes

Setting

Landform: Very steep areas on outwash terraces, outwash plains, and moraines
Shape of areas: Irregular
Size of areas: 5 to 95 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Severe

Map Unit Composition

Kalkaska soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Tokiahok soils in landscape positions similar to those of the Kalkaska soil
- The excessively drained Waiska soils in landscape positions similar to those of the Kalkaska soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are fine sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

14B—Rousseau fine sand, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on till-floored lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 55 acres

Typical Profile

Surface layer:
0 to 3 inches—black fine sand
Subsurface layer:
3 to 6 inches—brown fine sand
Subsoil:
6 to 27 inches—dark brown and strong brown fine sand
Substratum:
27 to 80 inches—brown fine sand that has thin depositional strata of reddish brown loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Rousseau soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The well drained Ocqueoc soils in landscape positions similar to those of the Rousseau soil

Similar components:
- Soils that are medium sand throughout

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

14D—Rousseau fine sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 110 acres

Typical Profile

Surface layer:
0 to 3 inches—black fine sand
Subsurface layer:
3 to 6 inches—brown fine sand
Subsoil:
6 to 27 inches—dark brown and strong brown fine sand
Substratum:
27 to 80 inches—brown fine sand that has thin depositional strata of reddish brown loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Rousseau soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The well drained Ocqueoc soils in landscape positions similar to those of the Rousseau soil

Similar components:
- Soils that are medium sand throughout

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

15A—Croswell sand, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on outwash plains, outwash terraces, and till-floored lake plains
Shape of areas: Irregular
Size of areas: 8 to 300 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark brown sand
Subsurface layer:
3 to 7 inches—pinkish gray sand
Subsoil:
7 to 22 inches—reddish brown and yellowish red sand
22 to 34 inches—strong brown, mottled sand

Substratum:
34 to 70 inches—light brown, mottled sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Croswell soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils on low ridges and knolls
- The somewhat poorly drained Au Gres and poorly drained Deford and Kinross soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly sand
- Soils that have a loamy surface layer and subsoil
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, poor filtering capacity

Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of this soil can result in the pollution of ground water.

16A—Paquin sand, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on outwash plains, moraines, and till-floored lake plains
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 11 inches—reddish gray sand
Subsoil:
11 to 12 inches—dark reddish brown sand
12 to 14 inches—dark reddish brown, strongly cemented sand
14 to 27 inches—brown sand
27 to 36 inches—strong brown, mottled sand
Substratum:
36 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid in the surface layer and in the upper part of the subsoil, moderate or moderately rapid in the middle and lower parts of the subsoil, and rapid in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Paquin soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford soils in depressions and drainageways
- The well drained Garlic soils on low ridges and knolls
- The well drained Voelker and excessively drained Waiska soils in the slightly higher positions on the landscape

Similar components:
- Soils in which the subsoil is less cemented

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Seasonal wetness, poor filtering capacity

Management considerations:

- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of this soil can result in the pollution of ground water.

17A—Au Gres sand, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on outwash plains, outwash terraces, and till-floored lake plains

Shape of areas: Irregular or elongated

Size of areas: 5 to 150 acres

Typical Profile

Organic mat:

0 to 2 inches—black, well decomposed forest litter

Surface layer:

2 to 8 inches—dark reddish gray sand

Subsoil:

8 to 13 inches—dark reddish brown, mottled sand

13 to 27 inches—yellowish red, mottled sand

Substratum:

27 to 80 inches—brown, mottled sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Au Gres soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford and Kinross soils in depressions and drainageways
- The excessively drained Rubicon and moderately well drained Paquin soils on low ridges and knolls

Similar components:
- Soils that are fine sand throughout
- Soils that have a loamy substratum
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, poor filtering capacity
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of this soil can result in the pollution of ground water.

18—Kinross mucky peat

Setting

Landform: Depressions and drainageways on outwash plains, moraines, and till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 60 acres

Typical Profile

Surface layer:
0 to 3 inches—black mucky peat
3 to 5 inches—very dark gray muck
Subsurface layer:
5 to 10 inches—light brownish gray, mottled sand
Subsoil:
10 to 30 inches—very dark brown and dark brown, mottled sand
30 to 42 inches—dark yellowish brown, mottled sand
Substratum:
42 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Kinross soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and Finch soils in the slightly higher positions on the landscape
- The very poorly drained Dawson and Greenwood soils in landscape positions similar to those of the Kinross soil
- The excessively drained Rubicon soils on hills and knolls

Similar components:
- Soils that have a substratum of gravelly sand
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.

- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

19—Deford muck

Setting

Landform: Depressions and drainageways on outwash plains, moraines, and till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 6 to 40 acres

Typical Profile

Surface layer:
0 to 6 inches—black muck
Substratum:
6 to 30 inches—grayish brown and brown, mottled sand
30 to 80 inches—very dark gray sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Deford soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and moderately well drained Croswell soils in the slightly higher positions on the landscape
- The very poorly drained Tawas soils in the slightly lower positions on the landscape
- The excessively drained Rubicon and Kalkaska soils on hills and knolls

Similar components:
- Soils in which the lower part of the substratum is gravelly sand or gravelly fine sandy loam

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

20B—Rousseau-Ocqueoc fine sands, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash plains and till-floored lake plains
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Rousseau
Surface layer:
0 to 3 inches—black fine sand

Subsurface layer:
3 to 6 inches—brown fine sand
Subsoil:
6 to 27 inches—dark brown and strong brown fine sand
Substratum:
27 to 80 inches—brown fine sand that has thin depositional strata of reddish brown loamy fine sand

Ocqueoc
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sand
Subsurface layer:
2 to 7 inches—pinkish gray fine sand
Subsoil:
7 to 27 inches—reddish brown and yellowish red fine sand
Substratum:
27 to 33 inches—dark brown loamy fine sand
33 to 80 inches—stratified reddish brown very fine sandy loam and light reddish brown loamy very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rousseau—rapid; Ocqueoc—rapid in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Rousseau—low; Ocqueoc—moderate
Drainage class: Well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Rousseau soil and similar soils: 50 to 70 percent
Ocqueoc soil and similar soils: 15 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The well drained Alcona soils in landscape positions similar to those of the major soils
- The moderately well drained Croswell soils in the slightly lower positions on the landscape

Similar components:
- Soils that are medium sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland

Major management concerns: Equipment limitations, seedling mortality, plant competition

Management considerations:

- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Cropland

Major management concerns: Soil blowing, droughtiness

Management considerations:

- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Leaving crop residue on the surface and adding other organic material conserve moisture.

Pasture

Major management concerns: Overgrazing and seasonal droughtiness

Management considerations:

- Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, restricted permeability

Management considerations:

- The poor filtering capacity of the Rousseau soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Ocqueoc soil.

20D—Rousseau-Ocqueoc fine sands, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash plains and till-floored lake plains
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Rousseau

Surface layer:
0 to 3 inches—black fine sand
Subsurface layer:
3 to 6 inches—brown fine sand
Subsoil:
6 to 27 inches—dark brown and strong brown fine sand

Substratum:
27 to 80 inches—brown fine sand that has thin depositional strata of reddish brown loamy fine sand

Ocqueoc
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sand
Subsurface layer:
2 to 7 inches—pinkish gray fine sand
Subsoil:
7 to 27 inches—reddish brown and yellowish red fine sand
Substratum:
27 to 33 inches—dark brown loamy fine sand
33 to 80 inches—stratified reddish brown very fine sandy loam and light reddish brown loamy very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rousseau—rapid; Ocqueoc—rapid in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Rousseau—low; Ocqueoc—moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Rousseau soil and similar soils: 50 to 70 percent
Ocqueoc soil and similar soils: 15 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The well drained Alcona soils in landscape positions similar to those of the major soils

Similar components:
- Soils that are medium sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, seasonal droughtiness
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.

Pasture
Major management concerns: Overgrazing and seasonal droughtiness
Management considerations:
- Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope, poor filtering capacity, restricted permeability
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- The poor filtering capacity of the Rousseau soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Ocqueoc soil.

20E—Rousseau-Ocqueoc fine sands, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on till-floored lake plains and outwash plains
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Rousseau
Surface layer:
0 to 3 inches—black fine sand
Subsurface layer:
3 to 6 inches—brown fine sand
Subsoil:
6 to 27 inches—dark brown and strong brown fine sand
Substratum:
27 to 80 inches—brown fine sand that has thin depositional strata of reddish brown loamy fine sand

Ocqueoc
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sand
Subsurface layer:
2 to 7 inches—pinkish gray fine sand
Subsoil:
7 to 27 inches—reddish brown and yellowish red fine sand
Substratum:
27 to 33 inches—dark brown loamy fine sand
33 to 80 inches—stratified reddish brown very fine sandy loam and light reddish brown loamy very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rousseau—rapid; Ocqueoc—rapid in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Rousseau—low; Ocqueoc—moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Rousseau soil and similar soils: 50 to 70 percent
Ocqueoc soil and similar soils: 15 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford soils in depressions and drainageways
- The well drained Alcona soils in landscape positions similar to those of the major soils

Similar components:
- Soils that are medium sand throughout
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition

Management considerations:

- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Slope

Management considerations:

- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields

Major management concerns: Slope

Management considerations:

- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

22B—Alcona loamy very fine sand, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains and ground moraines
Shape of areas: Irregular
Size of areas: 5 to 20 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand
Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand, reddish brown fine sandy loam, and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Alcona soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Ocqueoc and somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Alcona soil
- The poorly drained Deford soil in depressions and drainageways
- The moderately well drained Fence soils in the slightly lower positions on the landscape

Similar components:
- Soils that have a substratum of sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.

- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Overgrazing, seasonal droughtiness
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

24B—Munising fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and in the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Munising soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways
- Moderately well drained soils that have bedrock at a depth of 20 to 60 inches; in landscape positions similar to those of the Munising soil

Similar components:
- Soils that have more gravel and cobbles in the surface layer and the upper part of the subsoil
- Soils that are fine sand in the surface layer and the upper part of the subsoil
- Soils that have a substratum of sand

Use and Management

Land use: Dominant use—woodland (fig. 12); other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, compaction, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Figure 12.—A hardwood forest in an area of Munising fine sandy loam, 1 to 6 percent slopes. Sugar maple is the dominant tree species.

Pasture

Major management concerns: Seasonal wetness
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

24D—Munising fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 5 to 125 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Munising soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Keweenaw soils in landscape positions similar to those of the Munising soil
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
- Soils that have more gravel and cobbles in the surface layer and the upper part of the subsoil
- Soils that are fine sand in the surface layer and the upper part of the subsoil
- Soils that have a substratum of sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, compaction, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Seasonal wetness
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope

Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

25B—Munising-Yalmer complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 10 to 75 acres

Typical Profile

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Yalmer
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—mottled, very firm, dark reddish gray loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—mottled, very firm, reddish brown fine sandy loam and dark reddish gray loamy fine sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum; Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Munising—slow; Yalmer—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Munising soil and slight in areas of the Yalmer soil
Hazard of soil blowing: Munising—moderate; Yalmer—severe

Map Unit Composition

Munising soil and similar soils: 55 to 70 percent
Yalmer soil and similar soils: 15 to 30 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- Moderately well drained soils that have bedrock at a depth of 20 to 60 inches; in landscape positions similar to those of the major soils
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways
- The excessively drained Kalkaska and Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Soils that have more gravel and cobbles in the surface layer and the upper part of the subsoil
- Soils that have a substratum of sand

Use and Management

Land use: Dominant uses—woodland, pasture; other use—cropland

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- In areas of the Munising soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Pasture
Major management concerns: Overgrazing, compaction

Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter, seasonal droughtiness
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

25D—Munising-Yalmer complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 10 to 44 acres

Typical Profile

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam

Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Yalmer
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—mottled, very firm, dark reddish gray loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—mottled, very firm, reddish brown fine sandy loam and dark reddish gray loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum; Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe in areas of the Munising soil and moderate in areas of the Yalmer soil
Hazard of soil blowing: Munising—moderate; Yalmer—severe

Map Unit Composition

Munising soil and similar soils: 55 to 70 percent
Yalmer soil and similar soils: 15 to 30 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways
- The excessively drained Kalkaska and Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Soils that have more gravel and cobbles in the surface layer and the upper part of the subsoil
- Soils that have a substratum of sand

Use and Management

Land use: Dominant uses—woodland, pasture; other use—cropland

Woodland

Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Pasture

Major management concerns: Overgrazing, compaction

Management considerations:

- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter, seasonal droughtiness

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

26A—Skanee cobbly fine sandy loam, 0 to 3 percent slopes, stony

Setting

Landform: Nearly level areas on ground moraines and till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 150 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—very dark gray cobbly fine sandy loam
Subsurface layer:
4 to 7 inches—grayish brown, mottled cobbly fine sandy loam
Subsoil:
7 to 12 inches—brown sandy loam
12 to 14 inches—reddish brown, mottled, very firm loamy sand and sandy loam
14 to 30 inches—reddish brown, mottled, very firm sandy clay loam and fine sandy loam
Substratum:
30 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Skanee soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising soils on knolls and the poorly drained Gay soils in depressions and drainageways
- The somewhat poorly drained Zeba soils, which have bedrock at a depth of 20 to 40 inches; in landscape positions similar to those of the Skanee soil

Similar components:
- Soils that are sand in the surface layer and the upper part of the subsoil
- Soils that have a substratum of sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or winter, when the soil has an adequate snow cover.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Cropland
Major management concerns: Nutrient loss, seasonal wetness, tilth, compaction, content of organic matter
Management considerations:
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Shallow surface ditches help to remove surface water after heavy rains.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Seasonal wetness
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Seasonal wetness, cutbanks caving
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

27—Gay muck, stony

Setting

Landform: Depressions and drainageways on ground moraines and till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 300 acres

Typical Profile

Surface layer:
0 to 2 inches—black muck
2 to 5 inches—very dark grayish brown fine sandy loam
Subsurface layer:
5 to 18 inches—brown, mottled loamy sand
Subsoil:
18 to 31 inches—reddish brown, mottled sandy loam
Substratum:
31 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Gay soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising soils on knolls
- The somewhat poorly drained Skanee soils in the slightly higher positions on the landscape
- The poorly drained Jacobsville and very poorly drained Cathro soils in landscape positions similar to those of the Gay soil

Similar components:
- Soils that have a substratum of sand, gravelly sand, or stratified silt loam to find sand
- Soils that are slightly alkaline in the substratum

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development

Major management concerns: Ponding

Management considerations:

- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding

Management considerations:

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

28B—Keweenaw loamy sand, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains and moraines

Shape of areas: Irregular

Size of areas: 5 to 300 acres

Typical Profile

Surface layer:

0 to 1 inch—black loamy sand

Subsurface layer:

1 to 3 inches—reddish brown loamy sand

Subsoil:

3 to 25 inches—dark reddish brown and reddish brown loamy sand

25 to 36 inches—reddish brown loamy sand and light reddish brown sand

36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Moderately rapid

Available water capacity: Low

Drainage class: Well drained

Surface runoff class: Very slow

Flooding: None

Content of organic matter: Low

Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Keweenaw soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising and Yalmer soils in landscape positions similar to those of the Keweenaw soil
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are sand throughout

Use and Management

Woodland
Major management concerns: Plant competition
Management considerations:
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: None

28D—Keweenaw loamy sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains and moraines
Shape of areas: Irregular
Size of areas: 8 to 150 acres

Typical Profile

Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 36 inches—reddish brown loamy sand and light reddish brown sand
36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid

Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Keweenaw soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising and Yalmer soils in landscape positions similar to those of the Keweenaw soil
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are sand throughout

Use and Management

Woodland
Major management concerns: Erosion hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

28E—Keweenaw loamy sand, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on till-floored lake plains and moraines
Shape of areas: Irregular
Size of areas: 12 to 50 acres

Typical Profile

Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 36 inches—reddish brown loamy sand and light reddish brown sand
36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keweenaw soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the Keweenaw soil
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are sand throughout

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

29B—Yalmer fine sand, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 15 to 350 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—mottled, very firm, dark reddish gray loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—mottled, very firm, reddish brown fine sandy loam and dark reddish gray loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Yalmer soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Kalkaska soils in landscape positions similar to those of the Yalmer soil
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
- Soils that are fine sandy loam in the surface layer and the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, seasonal droughtiness, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Seasonal droughtiness
Management considerations:
- Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability

Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

29D—Yalmer fine sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on ground moraines and till-floored lake plains
Shape of areas: Irregular
Size of areas: 25 to 90 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—mottled, very firm, dark reddish gray loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—mottled, very firm, reddish brown fine sandy loam and dark reddish gray loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Yalmer soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Kalkaska and well drained Tokiahok soils in landscape positions similar to those of the Yalmer soil
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
- Soils that are fine sandy loam in the surface layer and the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, seasonal droughtiness, content of organic matter

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture

Major management concerns: Seasonal droughtiness

Management considerations:

- Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

31D—Trenary silt loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on ground moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—reddish gray silt loam
Subsoil:
5 to 15 inches—dark reddish brown silt loam and reddish brown fine sandy loam
15 to 21 inches—brown and reddish brown, very firm fine sandy loam
21 to 48 inches—reddish brown loamy fine sand and fine sandy loam
Substratum:
48 to 80 inches—reddish brown cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Trenary soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Shoepac and somewhat poorly drained Charlevoix soils in the lower positions on the landscape
- The well drained Keweenaw soils in landscape positions similar to those of the Trenary soil
- The poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have a substratum of sand or gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Carefully managed reforestation helps to control undesirable understory plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope, restricted permeability
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

32A—Charlevoix silt loam, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on fluted ground moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 140 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 3 inches—very dark gray silt loam
Subsurface layer:
3 to 8 inches—brown silt loam
Subsoil:
8 to 12 inches—brown, mottled silt loam
12 to 28 inches—reddish brown, mottled fine sandy loam
Substratum:
28 to 80 inches—reddish brown, mottled cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer
Available water capacity: Moderate

Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Charlevoix soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Sundell soils in landscape positions similar to those of the Charlevoix soil
- The moderately well drained Shoepac soils in the slightly higher positions on the landscape
- The poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have more gravel and cobbles in the surface layer and subsoil
- Soils that are sand in the upper 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness
Management considerations:
- Mounding or adding suitable fill material helps to raise the absorption field above the water table.

33—Ensley muck

Setting

Landform: Depressions and drainageways on fluted ground moraines and drumlinized ground moraines
Shape of areas: Elongated or oval
Size of areas: 5 to 60 acres

Typical Profile

Surface layer:
0 to 5 inches—black muck
Subsurface layer:
5 to 7 inches—black mucky loam
Subsoil:
7 to 19 inches—brown, mottled fine sandy loam
Substratum:
19 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Ensley soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet soils on hills and knolls
- The somewhat poorly drained Solona soils in the slightly higher positions on the landscape
- The very poorly drained Cathro soils in the lower positions on the landscape

Similar components:
- Soils in which the surface layer is 9 to 15 inches thick
- Soils that have bedrock at a depth of 40 to 80 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.

- Because of wetness and low strength, equipment can be used only when skid roads and access roads are frozen or when the snow cover is adequate.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

34B—Onaway fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Oval or irregular
Size of areas: 15 to 500 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—brown fine sandy loam
13 to 18 inches—dark brown sandy clay loam
18 to 25 inches—brown gravelly fine sandy loam
Substratum:
25 to 80 inches—light brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Onaway soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Escanaba, Nadeau, and Cunard soils in landscape positions similar to those of the Onaway soil
- The somewhat poorly drained Solona and poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have less than 18 percent clay in the argillic horizon

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Erosion, compaction
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: None

Septic tank absorption fields
Major management concerns: Restricted permeability
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

34D—Onaway fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Moderately sloping and strongly sloping areas on drumlins and ground moraines
Shape of areas: Oval or irregular
Size of areas: 5 to 150 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—brown fine sandy loam
13 to 18 inches—dark brown sandy clay loam
18 to 25 inches—brown gravelly fine sandy loam
Substratum:
25 to 80 inches—light brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Onaway soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Escanaba and Nadeau soils in landscape positions similar to those of the Onaway soil
- The poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have less than 18 percent clay in the argillic horizon

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland

Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter
Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture

Major management concerns: Erosion, compaction
Management considerations:

- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Slope
Management considerations:

- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Restricted permeability, slope
Management considerations:

- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

34E—Onaway fine sandy loam, 18 to 35 percent slopes

Setting

Landform: Steep areas on drumlins and ground moraines
Shape of areas: Oval or irregular
Size of areas: 5 to 90 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—brown fine sandy loam
13 to 18 inches—dark brown sandy clay loam
18 to 25 inches—brown gravelly fine sandy loam
Substratum:
25 to 80 inches—light brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Onaway soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Escanaba and Nadeau soils in landscape positions similar to those of the Onaway soil
- The poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have less than 18 percent clay in the argillic horizon

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.

- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

35B—Champion cobbly fine sandy loam, 1 to 6 percent slopes, very stony

Setting

Landform: Gently undulating areas on ground moraines
Shape of areas: Irregular
Size of areas: 5 to 350 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 26 inches—dark reddish brown and reddish brown cobbly fine sandy loam
26 to 36 inches—reddish brown, mottled, very firm gravelly sandy loam
36 to 43 inches—brown, mottled, very firm gravelly loamy sand
Substratum:
43 to 80 inches—brown gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderately rapid in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Champion soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways
- The well drained Sundog soils in landscape positions similar to those of the Champion soil

Similar components:
- Soils that have igneous and metamorphic bedrock at a depth of 40 to 60 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

35D—Champion cobbly fine sandy loam, 6 to 18 percent slopes, very stony

Setting

Landform: Gently rolling and rolling areas on ground moraines
Shape of areas: Irregular
Size of areas: 5 to 20 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 26 inches—dark reddish brown and reddish brown cobbly fine sandy loam
26 to 36 inches—reddish brown, mottled, very firm gravelly sandy loam
36 to 43 inches—brown, mottled, very firm gravelly loamy sand
Substratum:
43 to 80 inches—brown gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderately rapid in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Champion soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Net soils in depressions and drainageways
- The well drained Keewaydin and Sundog soils in landscape positions similar to those of the Champion soil

Similar components:
- Soils that have igneous and metamorphic bedrock at a depth of 40 to 60 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

36A—Net cobbly very fine sandy loam, 0 to 3 percent slopes, very stony

Setting

Landform: Nearly level areas on bedrock-controlled moraines and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—pinkish gray cobbly very fine sandy loam
Subsoil:
5 to 18 inches—dark brown and reddish brown, mottled cobbly very fine sandy loam
18 to 45 inches—brown, mottled, very firm gravelly fine sandy loam
Substratum:
45 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum

Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Net soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils on knolls
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have more cobbles and stones in the surface layer and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

37—Witbeck very stony muck, extremely bouldery

Setting

Landform: Depressions and drainageways on bedrock-controlled moraines and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—black very stony muck
Subsurface layer:
8 to 15 inches—gray very stony fine sandy loam and greenish gray, mottled very stony very fine sandy loam
Subsoil:
15 to 24 inches—dark olive gray, mottled very stony fine sandy loam and olive gray, mottled gravelly fine sandy loam
Substratum:
24 to 80 inches—dark gray, mottled gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 3 to 10 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Witbeck soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Net soils in the slightly higher positions on the landscape
- The well drained Keewaydin soils on knolls

Similar components:
- Soils in which the substratum is stratified sand and gravelly sand
- Soils in which the organic surface layer is more than 15 inches thick

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.

- Because of low strength, suitable surfacing material is needed on year-round logging roads and landings. Culverts are needed to maintain the natural drainage system.
- Large stones and boulders on the surface can hinder harvesting operations and damage equipment.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

38B—Pence fine sandy loam, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 600 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—dark brown and brown fine sandy loam
13 to 16 inches—strong brown loamy coarse sand
16 to 31 inches—dark yellowish brown coarse sand
Substratum:
31 to 80 inches—dark yellowish brown and yellowish brown, stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid or very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Pence soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways
- The well drained Sundog soils in landscape positions similar to those of the Pence soil

Similar components:
- Soils that have more gravel in the subsoil
- Soils that have a surface layer of sand or loamy sand

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

38D—Pence fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 50 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—dark brown and brown fine sandy loam
13 to 16 inches—strong brown loamy coarse sand
16 to 31 inches—dark yellowish brown coarse sand
Substratum:
31 to 80 inches—dark yellowish brown and yellowish brown, stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid or very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pence soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways
- The well drained Sundog soils in landscape positions similar to those of the Pence soil

Similar components:
- Soils that have more gravel in the subsoil
- Soils that have a surface layer of sand or loamy sand

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

38E—Pence fine sandy loam, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—dark brown and brown fine sandy loam
13 to 16 inches—strong brown loamy coarse sand
16 to 31 inches—dark yellowish brown coarse sand
Substratum:
31 to 80 inches—dark yellowish brown and yellowish brown, stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid or very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pence soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways
- The excessively drained Rubicon soils in landscape positions similar to those of the Pence soil

Similar components:
- Soils that have more gravel in the subsoil
- Soils that have a surface layer of sand or loamy sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on

the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

39B—Amasa very fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash plains, outwash terraces, and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 2 inches—black very fine sandy loam
Subsurface layer:
2 to 5 inches—brown very fine sandy loam
Subsoil:
5 to 16 inches—dark brown very fine sandy loam
Substratum:
16 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsoil and rapid or very rapid in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Amasa soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Amasa soil
- The poorly drained Deford and Minocqua soils in depressions and drainageways
- The moderately well drained Chabeneau soils in the slightly lower positions on the landscape

Similar components:
- Soils that have fewer cobbles and pebbles in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

39D—Amasa very fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash plains, outwash terraces, and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 15 to 200 acres

Typical Profile

Surface layer:
0 to 2 inches—black very fine sandy loam
Subsurface layer:
2 to 5 inches—brown very fine sandy loam
Subsoil:
5 to 16 inches—dark brown very fine sandy loam
Substratum:
16 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsoil and rapid or very rapid in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Amasa soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Amasa soil
- The poorly drained Deford and Minocqua soils in depressions and drainageways
- The moderately well drained Chabeneau soils in the lower landscape positions

Similar components:
- Soils that have fewer cobbles and pebbles in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

39E—Amasa very fine sandy loam, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash plains, outwash terraces, and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 2 inches—black very fine sandy loam
Subsurface layer:
2 to 5 inches—brown very fine sandy loam
Subsoil:
5 to 16 inches—dark brown very fine sandy loam
Substratum:
16 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsoil and rapid or very rapid in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Amasa soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Amasa soil
- The poorly drained Deford and Minocqua soils in depressions and drainageways
- The moderately well drained Chabeneau soils in the lower landscape positions

Similar components:
- Soils that have fewer cobbles and pebbles in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.

- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

40B—Waiska cobbly loamy sand, 0 to 6 percent slopes

Setting

Landform: Nearly level and undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Waiska soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Waiska soil
- The poorly drained Minocqua and Deford soils in depressions and drainageways

Similar components:
- Soils that have fewer cobbles and pebbles in the substratum

Use and Management

Woodland
Major management concerns: None

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

40D—Waiska cobbly loamy sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 10 to 150 acres

Typical Profile

Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Waiska soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Waiska soil
- Deford and Minocqua soils in depressions and drainageways

Similar components:
- Soils that have fewer cobbles and pebbles in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns:
Management considerations: Poor filtering capacity, slope
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

41A—Channing fine sandy loam, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 45 to 50 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—dark reddish brown fine sandy loam
Subsurface layer:
5 to 9 inches—reddish gray, mottled very fine sandy loam
Subsoil:
9 to 18 inches—brown, mottled very fine sandy loam

18 to 22 inches—brown, mottled fine sandy loam
22 to 28 inches—strong brown, mottled gravelly sand
Substratum:
28 to 80 inches—brown gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Channing soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross and Minocqua soils in depressions and drainageways
- The somewhat excessively drained Pence soils on ridges and knolls
- The moderately well drained Chabeneau soils in the slightly higher positions on the landscape

Similar components:
- Soils that are sand or loamy sand in the surface layer and subsurface layer
- Soils that have a seasonal high water table at a depth of 40 to 80 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, poor filtering capacity
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of this soil can result in the pollution of ground water.

42—Minocqua muck

Setting

Landform: Depressions and drainageways on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 150 acres

Typical Profile

Organic mat:
0 to 2 inches—dark brown, undecomposed sphagnum moss
Surface layer:
2 to 5 inches—black muck
5 to 7 inches—very dark gray mucky fine sandy loam
Subsurface layer:
7 to 11 inches—dark grayish brown, mottled fine sandy loam
11 to 18 inches—grayish brown, mottled very fine sandy loam
Subsoil:
18 to 23 inches—dark grayish brown, mottled fine sandy loam
Substratum:
23 to 80 inches—dark grayish brown gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Low
Drainage class: Poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Minocqua soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing soils in the slightly higher positions on the landscape
- The very poorly drained Tawas soils in landscape positions similar to those of the Minocqua soil
- The well drained Sundog soils on knolls and ridges

Similar components:
- Soils that are sand in the subsurface layer and subsoil

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development

Major management concerns: Ponding

Management considerations:

- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding

Management considerations:

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

43B—Karlin sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash terraces, outwash plains, and disintegration moraines

Shape of areas: Irregular

Size of areas: 10 to 450 acres

Typical Profile

Organic mat:

0 to 1 inch—black, well decomposed forest litter

Surface layer:

1 to 4 inches—brown sandy loam

Subsoil:

4 to 15 inches—dark brown and brown sandy loam

15 to 29 inches—brown sand

Substratum:

29 to 80 inches—yellowish brown sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid in the lower part of the subsoil and in the substratum

Available water capacity: Low

Drainage class: Somewhat excessively drained

Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Karlin soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford soils in depressions and drainageways
- The moderately well drained Chabeneau soils in the slightly lower positions on the landscape

Similar components:
- Soils that are sand in the surface layer and the upper part of the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

43D—Karlin sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces, outwash plains, and disintegration moraines
Shape of areas: Irregular
Size of areas: 5 to 80 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—brown sandy loam

Subsoil:
4 to 15 inches—dark brown and brown sandy loam
15 to 29 inches—brown sand
Substratum:
29 to 80 inches—yellowish brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Karlin soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford soils in depressions and drainageways
- The moderately well drained Chabeneau soils in the lower positions on the landscape

Similar components:
- Soils that are sand in the surface layer and subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope

Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

44B—Carlshend fine sandy loam, 1 to 6 percent slopes, stony

Setting

Landform: Gently undulating areas on sandstone benches
Shape of areas: Irregular
Size of areas: 20 to 50 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish gray fine sandy loam
Subsoil:
3 to 14 inches—dark reddish brown fine sandy loam
Bedrock:
14 to 25 inches—yellowish brown, mottled, weathered sandstone
25 inches—pale brown and light gray sandstone

Soil Properties and Qualities

Depth class: Shallow to sandstone bedrock
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Carlshend soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising soils in landscape positions similar to those of the Carlshend soil
- The somewhat poorly drained Zeba and poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils that have sandstone bedrock at a depth of more than 20 inches

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Depth to bedrock, cutbanks caving, seasonal wetness

Management considerations:

- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Depth to bedrock, seasonal wetness

Management considerations:

- Because of wetness and the depth to bedrock, this soil is poorly suited to use as a site for septic tank absorption fields. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material that raises the site a sufficient distance above the bedrock and the water table can help to overcome these limitations.

45A—Zeba cobbly fine sandy loam, 0 to 3 percent slopes, very stony

Setting

Landform: Nearly level areas on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 5 to 150 acres

Typical Profile

Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 10 inches—reddish gray cobbly fine sandy loam
Subsoil:
10 to 14 inches—reddish brown, mottled cobbly fine sandy loam
14 to 31 inches—mottled, brown loamy sand and reddish brown sandy loam
Bedrock:
31 inches—very dusky red sandstone bedrock

Soil Properties and Qualities

Depth class: Moderately deep to sandstone bedrock
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Zeba soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Onota soils on knolls
- The moderately well drained Chocolay and Carlshend soils in the slightly higher positions on the landscape
- The poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that have a subsoil of gravelly sand

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above bedrock and the water table.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- Because of wetness and the depth to bedrock, this soil is poorly suited to use as a site for septic tank absorption fields. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding

with a suitable filtering material that raises the site a sufficient distance above the bedrock and the water table can help to overcome these limitations.

46—Jacobsville muck, very stony

Setting

Landform: Depressions and drainageways on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 8 to 350 acres

Typical Profile

Surface layer:
0 to 4 inches—black muck
Subsurface layer:
4 to 9 inches—dark gray, mottled loam
Subsoil:
9 to 16 inches—reddish brown, mottled sandy loam
Substratum:
16 to 25 inches—reddish brown, mottled sandy loam
25 to 28 inches—reddish brown, mottled, soft weathered sandstone
Bedrock:
28 inches—reddish brown sandstone

Soil Properties and Qualities

Depth class: Moderately deep to sandstone bedrock
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Jacobsville soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Zeba soils in the slightly higher positions on the landscape
- The moderately well drained Chocolay and Sauxhead soils on knolls

Similar components:
- Soils that have a substratum of gravelly sand
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Depth to bedrock, ponding
Management considerations:
- Because of the depth to bedrock and ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Depth to bedrock, ponding
Management considerations:
- Because of the depth to bedrock and ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

48—Burt muck

Setting

Landform: Depressions and drainageways on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 5 to 300 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 5 inches—black muck
5 to 7 inches—black mucky loamy sand
Subsurface layer:
7 to 8 inches—reddish gray, mottled gravelly sand
Subsoil:
8 to 18 inches—dark reddish brown, mottled gravelly sand
Bedrock:
18 inches—dark reddish brown sandstone

Soil Properties and Qualities

Depth class: Shallow to sandstone bedrock
Permeability: Rapid
Available water capacity: Very low
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded

Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Burt soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Jeske and Zeba soils in the slightly higher positions on the landscape
- The excessively drained Buckroe and Yellowdog soils in the higher positions on the landscape

Similar components:
- Soils that have bedrock at a depth of more than 20 inches
- Soils that have a loamy subsurface layer and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of the depth to bedrock and ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of the depth to bedrock and ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

50A—Sundell loam, 0 to 3 percent slopes

Setting

Landform: Depressions and drainageways on ground moraines over limestone, dolomite, or dolomitic sandstone

Shape of areas: Irregular or elongated
Size of areas: 8 to 30 acres

Typical Profile

Organic mat:
0 to 1 inch—well decomposed forest litter
Surface layer:
1 to 8 inches—black, mottled loam
Subsurface layer:
8 to 11 inches—brown and black, mottled fine sandy loam
Subsoil:
11 to 17 inches—brown, mottled fine sandy loam
Substratum:
17 to 22 inches—light brown, mottled gravelly fine sandy loam
Bedrock:
22 inches—pale brown dolomite

Soil Properties and Qualities

Depth class: Moderately deep to dolomite, dolomitic sandstone, or limestone
Permeability: Moderate
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Sundell soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Nahma soils in the slightly lower positions on the landscape
- Moderately well drained soils in the slightly higher positions on the landscape
- The well drained Cunard soils on knolls

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above bedrock and the water table.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- Because of seasonal wetness and the depth to bedrock, this soil is poorly suited to use as a site for septic tank absorption fields. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

51—Nahma muck

Setting

Landform: Depressions and drainageways on ground moraines
Shape of areas: Irregular
Size of areas: 8 to 150 acres

Typical Profile

Surface layer:
0 to 11 inches—black muck
Subsurface layer:
11 to 14 inches—very dark grayish brown mucky loam
Subsoil:
14 to 17 inches—dark gray, mottled loam
17 to 19 inches—brown, mottled loam
Substratum:
19 to 24 inches—brown, mottled gravelly fine sandy loam
Bedrock:
24 inches—dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep to dolomitic sandstone, dolomite, or limestone
Permeability: Moderate
Available water capacity: Low
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Nahma soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Sundell and Solona soils in the slightly higher positions on the landscape

- The very poorly drained Chippeny and Carbondale soils in landscape positions similar to those of the Nahma soil

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of ponding and the depth to bedrock, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of ponding and the depth to bedrock, this soil is generally unsuited to use as a site for septic tank absorption fields.

52B—Summerville fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on ground moraines
Shape of areas: Irregular
Size of areas: 5 to 85 acres

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown fine sandy loam
Subsoil:
5 to 13 inches—dark brown fine sandy loam
Bedrock:
13 inches—pale brown dolomitic sandstone

Soil Properties and Qualities

Depth class: Shallow to dolomitic sandstone, dolomite, or limestone
Permeability: Moderate
Available water capacity: Very low
Drainage class: Well drained

Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Summerville soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Sundell and poorly drained Nahma soils in depressions and drainageways
- The well drained Emmet soils in landscape positions similar to those of the Summerville soil

Similar components:
- Soils that have bedrock at a depth of more than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- The depth to bedrock should be considered when road locations and landing sites are planned.
- Because of the depth to bedrock, planting is not practical on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Depth to bedrock
Management considerations:
- Excavation is hampered by the limited depth to bedrock.

Septic tank absorption fields
Major management concerns: Depth to bedrock
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the limited depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

55F—Michigamme-Rock outcrop complex, 25 to 70 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines over igneous and metamorphic bedrock

Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 6 to 2,000 acres

Typical Profile

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Michigamme
Depth class: Moderately deep to igneous or metamorphic bedrock
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Rapid
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Michigamme soil and similar soils: 55 to 80 percent
Rock outcrop: 10 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keewaydin and Schweitzer soils in landscape positions similar to those of the Michigamme soil
- The moderately well drained Dishno soils in areas that have slopes of less than 18 percent
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.

- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Rock outcrops and boulders may interfere with the use of harvesting equipment and the placement of haul roads.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

56D—Peshekee-Rock outcrop complex, 6 to 18 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines over igneous and metamorphic bedrock
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 60 acres

Typical Profile

Peshekee
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—dark brown cobbly very fine sandy loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly very fine sandy loam
Subsoil:
5 to 14 inches—dark reddish brown cobbly very fine sandy loam
Bedrock:
14 inches—granite

Soil Properties and Qualities

Peshekee
Depth class: Shallow to igneous or metamorphic bedrock
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Very low

Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Peshekee soil and similar soils: 30 to 55 percent
Rock outcrop: 30 to 55 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Dishno and somewhat excessively drained Ishpeming soils in landscape positions similar to those of the Peshekee soil
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 20 inches
- Soils in areas where the surface stones and boulders are 1 to 3 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the slope, the depth to bedrock, the large boulders, and the rock outcrops, logging operations are not practical in areas of this map unit.

Building site development
Major management concerns: Depth to bedrock, slope
Management considerations:
- Excavation is hampered by the depth to bedrock.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Depth to bedrock, slope
Management considerations:
- This map unit is generally unsuited to use as a site for septic tank absorption fields because of the limited depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies.

56E—Peshekee-Rock outcrop complex, 18 to 35 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines over igneous and metamorphic bedrock
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Peshekee

Organic mat:
0 to 1 inch—black, well decomposed forest litter

Surface layer:
1 to 3 inches—dark brown cobbly very fine sandy loam

Subsurface layer:
3 to 5 inches—reddish gray cobbly very fine sandy loam

Subsoil:
5 to 14 inches—dark reddish brown cobbly very fine sandy loam

Bedrock:
14 inches—granite

Soil Properties and Qualities

Peshekee

Depth class: Shallow to igneous or metamorphic bedrock
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Very low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Peshekee soil and similar soils: 30 to 55 percent
Rock outcrop: 30 to 55 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming soils in landscape positions similar to those of the Peshekee soil
- The moderately well drained Dishno soils in areas that have slopes of less than 18 percent
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 20 inches
- Soils in areas where the surface stones and boulders are less than 1 to 3 feet apart

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the slope, the depth to bedrock, large boulders, and the rock outcrop, logging operations are not practical in areas of this map unit.

Building site development

Major management concerns: Slope

Management considerations:
- Because of the slope, this map unit is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

56F—Peshekee-Rock outcrop complex, 35 to 70 percent slopes, very bouldery

Setting

Landform: Very steep areas on bedrock-controlled moraines over igneous and metamorphic bedrock
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 8 to 1,000 acres

Typical Profile

Peshekee
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—dark brown cobbly very fine sandy loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly very fine sandy loam
Subsoil:
5 to 14 inches—dark reddish brown cobbly very fine sandy loam
Bedrock:
14 inches—granite

Soil Properties and Qualities

Peshekee
Depth class: Shallow to igneous or metamorphic bedrock
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Very low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Peshekee soil and similar soils: 30 to 55 percent
Rock outcrop: 30 to 55 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming soils in landscape positions similar to those of the Peshekee soil
- The moderately well drained Dishno soils in areas that have slopes of less than 18 percent
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 20 inches
- Soils in areas where the surface stones and boulders are less than 1 to 3 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the slope, the depth to bedrock, large boulders, and the rock outcrops, logging operations are not practical in areas of this map unit.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

57—Carbondale and Tawas soils

Setting

Landform: Depressions and drainageways on moraines, outwash plains, and till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 3,000 acres

Typical Profile

Carbondale
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 38 inches—black muck
Bottom tier:
38 to 80 inches—black mucky peat

Tawas
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 25 inches—black muck

Substratum:
25 to 80 inches—grayish brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Carbondale—moderately slow to moderately rapid; Tawas—moderately slow to moderately rapid in the surface and subsurface tiers and rapid in the substratum
Available water capacity: Very high
Drainage class: Very poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Carbondale soil and similar soils: 20 to 80 percent
Tawas soil and similar soils: 10 to 75 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Deford and Ensley soils near the edges of the mapped areas
- Moderately well drained, sandy and loamy soils on low knolls
- Excessively drained to well drained, sandy soils and well drained, loamy soils on ridges and knolls

Similar components:
- Tawas soils that have a loamy substratum
- Carbondale soils that have a bottom tier of muck

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted in areas of this map unit.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding, excess humus, low strength
Management considerations:
- Because of ponding and the instability of the organic material, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Ponding, excess humus, low strength, restricted permeability

Management considerations:

- Because of ponding, restricted permeability, and the instability of the organic material, these soils are generally unsuited to use as sites for septic tank absorption fields.

58—Greenwood and Dawson soils

Setting

Landform Closed depressions on outwash plains, till-floored lake plains, and moraines
Shape of areas: Oval or irregular
Size of areas: 5 to 600 acres

Typical Profile

Greenwood

Surface tier:
0 to 8 inches—dark brown peat
Subsurface tier:
8 to 11 inches—black muck
Bottom tier:
11 to 65 inches—very dark brown mucky peat
65 to 80 inches—dark brown mucky peat

Dawson

Surface tier:
0 to 6 inches—dark brown peat
Subsurface tier:
6 to 11 inches—black muck
11 to 34 inches—very dark brown muck
Substratum:
34 to 36 inches—black sand
36 to 80 inches—dark grayish brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Greenwood—moderate or moderately rapid; Dawson—moderately slow to moderately rapid in the surface and subsurface tiers and rapid in the substratum
Available water capacity: Very high
Drainage class: Very poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Greenwood soil and similar soils: 50 to 85 percent
Dawson soil and similar soils: 10 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Kinross and somewhat poorly drained Au Gres soils in the slightly higher positions at the edges of the mapped areas
- The moderately well drained Croswell and Paquin soils on low knolls
- The excessively drained Rubicon soils on ridges and knolls

Similar components:
- Greenwood soils that have a bottom tier of muck

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- These soils are generally unsuited to woodland management because of the extreme acidity, the instability of the organic matter, and the wetness. Overcoming these limitations is not practical.

Building site development
Major management concerns: Ponding, excess humus, low strength, subsidence
Management considerations:
- Because of ponding and the instability of the organic material, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, excess humus, low strength, subsidence, restricted permeability
Management considerations:
- Because of ponding, restricted permeability, and the instability of the organic material, these soils are generally unsuited to use as sites for septic tank absorption fields.

59—Chippeny and Nahma mucks

Setting

Landform: Depressions and drainageways on moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 250 acres

Typical Profile

Chippeny
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 29 inches—black muck
Substratum:
29 to 33 inches—very dark gray silt loam
33 to 38 inches—gray silt loam
Bedrock:
38 inches—gray limestone

Nahma
Surface layer:
0 to 11 inches—black muck

Subsurface layer:
11 to 14 inches—very dark grayish brown mucky loam
Subsoil:
14 to 17 inches—dark gray, mottled loam
17 to 19 inches—brown, mottled loam
Substratum:
19 to 24 inches—brown, mottled gravelly fine sandy loam
Bedrock:
24 inches—dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep to limestone, dolomite, or dolomitic sandstone
Permeability: Chippeny—moderately slow to moderately rapid in the surface layer and subsoil and moderate or moderately slow in the substratum; Nahma—moderate
Available water capacity: Chippeny—moderate; Nahma—low
Drainage class: Chippeny—very poorly drained; Nahma—poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Chippeny soil and similar soils: 50 to 65 percent
Nahma soil and similar soil: 20 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Sundell soils in the slightly higher positions on the landscape
- The moderately well drained Reade and Shoepac soils on low ridges and knolls

Similar components:
- Soils that have bedrock at a depth of more than 51 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding, depth to bedrock, low strength

Management considerations:
- Because of ponding, the depth to bedrock, and the instability of the organic material, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, depth to bedrock, restricted permeability
Management considerations:
- Because of ponding, the depth to bedrock, and restricted permeability, these soils are generally unsuited to use as sites for septic tank absorption fields.

60—Histosols and Aquents, ponded

Setting

Landform: Areas of open marsh in depressions and drainageways
Shape of areas: Elongated
Size of areas: 5 to 200 acres

Soil Properties and Qualities

Texture: Sandy, loamy, or mucky
Depth class: Very deep
Permeability: Very slow
Available water capacity: High
Drainage class: Very poorly drained
Surface runoff class: Ponded
Frequency of flooding: Frequent
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Slight

Map Unit Composition

Histosols: 55 to 80 percent
Aquents: 10 to 35 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Contrasting components:
- The very poorly drained Carbondale and Tawas soils in landscape positions similar to those of the major soils
- Areas of open water
- Well drained, sandy and loamy soils on knolls and ridges

Use and Management

Wildlife habitat
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, these soils are unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding

Management considerations:
- Because of ponding, these soils are unsuited to use as sites for septic tank absorption fields.

61—Pits, borrow

Setting

Landform: Pits
Shape of areas: Oval or irregular
Size of areas: 3 to 300 acres

Map Unit Composition

Pits: 100 percent

Use and Management

Source of sand and gravel
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

62B—Udorthents and Udipsamments, nearly level and gently sloping

Setting

Landscape position: Nearly level and gently sloping areas where the original soil material has been altered as a result of cutting and filling
Shape of areas: Irregular or oval
Size of areas: 5 to 85 acres

Typical Profile

Udorthents
Surface layer:
0 to 6 inches—reddish brown cobbly fine sandy loam
Substratum:
6 to 80 inches—reddish brown gravelly sandy loam

Udipsamments
Surface layer:
0 to 6 inches—strong brown sand
Substratum:
6 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Udorthents—moderate or moderately slow; Udipsamments—rapid
Available water capacity: Udorthents—moderate; Udipsamments—low
Drainage class: Udorthents—well drained; Udipsamments—excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Udorthents—slight; Udipsamments—severe

Map Unit Composition

Udorthents and similar soils: 30 to 55 percent
Udipsamments and similar soils: 30 to 55 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- Areas of rock outcrop
- Somewhat poorly drained and poorly drained soils

Similar components:
- Undisturbed areas of Udorthents and Udipsamments

Use and Management

Land use: Urban land or idle areas
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

64—Pits and Dumps, mine

Setting

Landscape position: Nearly level to very steep areas at active and former mining locations
Shape of areas: Irregular or oval
Size of areas: 10 to 3,600 acres

Map Unit Composition

About 70 percent of this map unit consists of open pit iron mines. Currently, large active iron mines are in operation at the Tilden and Empire mines near National Mine and Palmer. Inactive mines, such as the Republic, Humboldt, and several smaller mines near Negaunee, Ishpeming, and Gwinn, also are included in this unit. Some of these areas remain idle and are revegetating naturally. Other areas are being revegetated through reclamation efforts. Some small areas of water are included.

About 20 percent of this map unit consists of made land. These areas include roads, parking lots, railroad tracks, buildings, and small manmade ponds.

About 10 percent of this map unit is rock outcrop.

Use and Management

Land use: Active and inactive iron mines
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

65B—Udorthents-Urban land complex, nearly level and gently sloping

Setting

Landscape position: Nearly level and gently sloping urban areas
Shape of areas: Irregular
Size of areas: 20 to 100 acres

Typical Profile

Udorthents
Surface layer:
0 to 6 inches—reddish brown cobbly very fine sandy loam
Substratum:
6 to 80 inches—reddish brown very cobbly sandy loam

Soil Properties and Qualities

Udorthents
Depth class: Very deep
Permeability: Moderate or moderately slow
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow; medium or rapid in some areas, such as streets, parking lots, and other manmade areas
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Slight

Map Unit Composition

Udorthents and similar soils: 40 to 60 percent
Urban land: 25 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Areas of rock outcrop
- Somewhat poorly drained and poorly drained soils in depressions
- Excessively drained, sandy soils in landscape positions similar to those of the Udorthents

Similar components:
- Undisturbed areas of Udorthents

Use and Management

Land use: Udorthents—commercial, residential, and industrial sites; Urban land—streets, parking lots, buildings, and other structures
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

66B—Udipsamments-Urban land complex, nearly level and gently sloping

Setting

Landscape position: Nearly level and gently sloping urban areas
Shape of areas: Irregular
Size of areas: 10 to 1,800 acres

Typical Profile

Udipsamments
Surface layer:
0 to 6 inches—strong brown sand

Substratum:
6 to 80 inches—light brown sand

Soil Properties and Qualities

Udipsamments
Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Very slow or slow; medium or rapid in some areas, such as streets, parking lots, and other manmade areas
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Udipsamments and similar soils: 50 to 60 percent
Urban land: 25 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Areas of rock outcrop
- Poorly drained and very poorly drained soils in depressions
- Moderately well drained and well drained, loamy soils in landscape positions similar to those of the Udipsamments

Similar components:
- Undisturbed areas of Udipsamments

Use and Management

Land use: Udipsamments—residential, commercial, and industrial sites; Urban land—streets, parking lots, buildings, and other structures
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

67B—Urban land-Rubicon complex, 0 to 6 percent slopes

Setting

Landscape position: Nearly level and gently undulating urban areas mixed with areas of undisturbed soils
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—dark brown and strong brown sand

Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Rubicon—very deep
Permeability: Rubicon—rapid
Available water capacity: Rubicon—low
Drainage class: Rubicon—excessively drained
Surface runoff class: Rubicon—very slow; Urban land—dominantly very slow or slow but medium or rapid in some areas, such as streets, parking lots, and other manmade areas
Flooding: None
Content of organic matter: Rubicon—low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Urban land: 50 to 70 percent
Rubicon soil and similar soils: 25 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Areas of rock outcrop
- The moderately well drained Yalmer soils in landscape positions similar to those of the Rubicon soil
- Somewhat poorly drained and poorly drained soils in depressions and drainageways

Similar components:
- Soils that have cobbly or gravelly textures

Use and Management

Land use: Urban land—streets, parking lots, buildings, and other structures; Rubicon—residential, commercial, and industrial sites

Gardens, lawns, and environmental plantings
Major management concerns: Rubicon—droughtiness, soil blowing
Management considerations:
- Plants that can withstand droughtiness should be selected for planting.
- A good plant cover and mulch can help to control soil blowing.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- Sanitary facilities should be connected to public sewers and sewage treatment facilities.
- In areas where there are no sewage lines and septic tank absorption fields are installed, the poor filtering capacity of the Rubicon soil can result in the pollution of ground water.

- On large lots, an absorption system of shallow trenches with shrubbery planted around the perimeter of the system and low, uniform application rates help to minimize the risk of ground-water pollution.

68—Pits, quarries

Setting

Shape of areas: Irregular
Size of areas: 3 to 10 acres

Map Unit Composition

This map unit consists of small quarries in Sands Township that have been mined for Kona dolomite. Some small granite quarries north of Gwinn also are included in mapping. These areas were mined for use in the construction of the Sawyer Airport runways.

Use and Management

Land use: Quarries mined as a source of building, construction, and landscaping material
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

69B—Escanaba loamy fine sand, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Elongated
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black loamy fine sand
Subsurface layer:
3 to 6 inches—reddish gray loamy fine sand
Subsoil:
6 to 26 inches—dark reddish brown and brown loamy fine sand
26 to 42 inches—reddish brown loamy fine sand and dark reddish brown fine sandy loam
Substratum:
42 to 80 inches—reddish brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Very slow
Flooding: None

Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Escanaba soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet, Onaway, and Rousseau soils in landscape positions similar to those of the Escanaba soil
- The somewhat poorly drained Charlevoix and Solona soils in shallow depressions and drainageways
- The moderately well drained Shoepac soils in the slightly lower positions on the landscape

Similar components:
- Soils that have a substratum of sand or loamy sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland
Major management concerns: Equipment limitations, seedling mortality, plant competition
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Cropland
Major management concerns: Soil blowing, seasonal droughtiness
Management considerations:
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Leaving crop residue on the surface and adding other organic material conserve moisture.

Pasture
Major management concerns: Erosion, compaction
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability

Management considerations:
- Increasing the size of the absorption area may be necessary to compensate for the restricted permeability in the substratum.

69D—Escanaba loamy fine sand, 6 to 18 percent slopes

Setting

Landform: Moderately sloping and strongly sloping areas on drumlins and ground moraines
Shape of areas: Elongated
Size of areas: 6 to 60 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black loamy fine sand
Subsurface layer:
3 to 6 inches—reddish gray loamy fine sand
Subsoil:
6 to 26 inches—dark reddish brown and brown loamy fine sand
26 to 42 inches—reddish brown loamy fine sand and dark reddish brown fine sandy loam
Substratum:
42 to 80 inches—reddish brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Escanaba soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet, Onaway, and Rousseau soils in landscape positions similar to those of the Escanaba soil
- The somewhat poorly drained Charlevoix and Solona soils in shallow depressions and drainageways
- The moderately well drained Shoepac soils in the slightly lower positions on the landscape

Similar components:
- Soils that have a substratum of sand or loamy sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Cropland

Major management concerns: Soil blowing, droughtiness, water erosion, nutrient loss

Management considerations:

- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.

Pasture

Major management concerns: Erosion, compaction

Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Restricted permeability, slope

Management considerations:

- Increasing the size of the absorption area may be necessary to compensate for the restricted permeability in the substratum.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

70B—Nadeau fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on eskers, outwash terraces, and outwash plains
Shape of areas: Elongated
Size of areas: 5 to 65 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—black fine sandy loam
Subsurface layer:
5 to 7 inches—brown fine sandy loam
Subsoil:
7 to 10 inches—brown gravelly fine sandy loam
10 to 23 inches—reddish brown gravelly fine sandy loam and very gravelly sandy loam
23 to 36 inches—brown very gravelly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Nadeau soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet and Onaway soils in landscape positions similar to those of the Nadeau soil
- The poorly drained Minocqua soils in depressions and drainageways
- The moderately well drained Northland soils in the slightly lower positions on the landscape

Similar components:
- Soils that are sand in the surface layer and subsurface layer

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland

Major management concerns: Erosion hazard, equipment limitations, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, droughtiness, tilth, content of organic matter

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture

Major management concerns: Erosion, surface compaction

Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Poor filtering capacity

Management considerations:

- The poor filtering capacity of this soil can result in the pollution of ground water.

70D—Nadeau fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on eskers, outwash terraces, and outwash plains

Shape of areas: Irregular or elongated
Size of areas: 5 to 40 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—black fine sandy loam
Subsurface layer:
5 to 7 inches—brown fine sandy loam
Subsoil:
7 to 10 inches—brown gravelly fine sandy loam
10 to 23 inches—reddish brown gravelly fine sandy loam and very gravelly sandy loam
23 to 36 inches—brown very gravelly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Nadeau soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet and Onaway soils in landscape positions similar to those of the Nadeau soil
- The poorly drained Minocqua soils in depressions and drainageways
- The moderately well drained Northland soils in the lower positions on the landscape

Similar components:
- Soils that are sand in the surface layer and subsurface layer

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

71B—Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes

Setting

Landform: Evart—depressions and old stream channels; Sturgeon—low terraces; Pelkie—low knolls and ridges
Distinctive landscape features: Flood plains
Shape of areas: Elongated
Size of areas: 5 to 200 acres

Typical Profile

Evart
Surface layer:
0 to 10 inches—very dark brown, mottled silt loam
Subsurface layer:
10 to 18 inches—black, mottled loamy fine sand
Substratum:
18 to 80 inches—grayish brown sand with few thin bands of very dark brown organic material

Pelkie
Surface layer:
0 to 7 inches—very dark brown loamy fine sand
Substratum:
7 to 19 inches—strong brown loamy fine sand
19 to 30 inches—strong brown fine sand
30 to 80 inches—brown, mottled sand

Sturgeon
Surface layer:
0 to 6 inches—dark brown very fine sandy loam
Substratum:
6 to 24 inches—stratified, dark brown and yellowish brown, mottled loamy very fine sand and very fine sandy loam

24 to 35 inches—dark grayish brown, mottled very fine sandy loam
35 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Evart—rapid; Pelkie—rapid; Sturgeon—moderate in the surface layer and the upper part of the substratum and rapid in the lower part of the substratum
Available water capacity: Evart—low; Pelkie—low; Sturgeon—moderate
Drainage class: Evart—poorly drained; Pelkie—moderately well drained; Sturgeon—somewhat poorly drained
Surface runoff class: Very slow
Frequency of flooding: Occasional
Content of organic matter: Evart and Sturgeon—moderate; Pelkie—low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Evart soil and similar soils: 35 to 50 percent
Pelkie soil and similar soils: 25 to 35 percent
Sturgeon soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Tawas, Carbondale, and Cathro soils in depressions and old stream channels

Similar components:
- Evart soils that have a substratum of silt loam

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed in areas of the Evart soil. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- The seasonal high water table and spring flooding in areas of the Sturgeon and Pelkie soils restrict the use of equipment to midsummer, when the soils are dry, or midwinter, when there is an adequate snow cover.
- Landing sites generally can be used only during the driest time of the year.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of flooding, trees are generally not planted in areas of these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Seasonal flooding
Management considerations:
- Because of flooding, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Seasonal flooding

Management considerations:
- Because of flooding, these soils are generally unsuited to use as sites for septic tank absorption fields.

72B—Emmet fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Emmet soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Solona and poorly drained Ensley soils in depressions and drainageways
- The well drained Escanaba and Nadeau soils in landscape positions similar to those of the Emmet soil
- The moderately well drained Mashek soils in the slightly lower positions on the landscape

Similar components:
- Soils that are sandy clay loam in the lower part of the subsoil
- Soils that have dolomitic sandstone at a depth of 40 to 80 inches

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland

Major management concerns: Erosion hazard, equipment limitations, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture

Major management concerns: Erosion, surface compaction

Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: None

Septic tank absorption fields

Major management concerns: Restricted permeability

Management considerations:

- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

72D—Emmet fine sandy loam, 6 to 18 percent slopes

Setting

Landform: Moderately and strongly sloping areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 3 inches—black fine sandy loam

Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Emmet soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Solona and poorly drained Ensley soils in depressions and drainageways
- The well drained Escanaba and Nadeau soils in landscape positions similar to those of the Emmet soil
- The moderately well drained Mashek soils in the lower positions on the landscape

Similar components:
- Soils that are sandy clay loam in the lower part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter

Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Erosion, surface compaction
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Slope
Management considerations:
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Restricted permeability, slope
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

72E—Emmet fine sandy loam, 18 to 35 percent slopes

Setting

Landform: Steep areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep

Permeability: Moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Emmet soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Ensley soils in depressions and drainageways
- The well drained Escanaba and Nadeau soils in landscape positions similar to those of the Emmet soil

Similar components:
- Soils that are sandy clay loam in the lower part of the subsoil

Use and Management

Land use: Dominant use—woodland; other use—pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Pasture
Major management concerns: Erosion, surface compaction
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

73B—Gogebic cobbly silt loam, 1 to 6 percent slopes, very stony

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black cobbly silt loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 13 inches—dark reddish brown cobbly fine sandy loam
13 to 18 inches—reddish brown, firm cobbly sandy loam
18 to 62 inches—reddish brown, mottled, very firm very gravelly sandy loam and very gravelly loamy sand
Substratum:
62 to 80 inches—reddish brown very gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the middle and lower parts of the subsoil, and moderate in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Gogebic soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Tula and poorly drained Pleine soils in depressions and drainageways
- The moderately well drained Dishno soils in landscape positions similar to those of the Gogebic soil

- The well drained Schweitzer soils in the slightly higher positions on the landscape

Similar components:
- Soils that are sand or loamy sand in the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Stones, water erosion, soil blowing, nutrient loss, tilth, compaction, content of organic matter
Management considerations:
- Stones on the surface and cobblestones in the surface layer interfere with the use of tillage, planting, and harvesting equipment. Removing the stones and cobblestones can minimize wear on equipment.
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Seasonal wetness
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Seasonal wetness

Management considerations:
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

73D—Gogebic cobbly silt loam, 6 to 18 percent slopes, very stony

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Shape of areas: Irregular
Size of areas: 7 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black cobbly silt loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 13 inches—dark reddish brown cobbly fine sandy loam
13 to 18 inches—reddish brown, firm cobbly sandy loam
18 to 62 inches—reddish brown, mottled, very firm very gravelly sandy loam and very gravelly loamy sand
Substratum:
62 to 80 inches—reddish brown very gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the middle and lower parts of the subsoil, and moderate in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Gogebic soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Tula and poorly drained Pleine soils in depressions and drainageways
- The moderately well drained Dishno and well drained Schweitzer soils in landscape positions similar to those of the Gogebic soil

Similar components:
- Soils that are sand or loamy sand in the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Stones, water erosion, soil blowing, nutrient loss, tilth, compaction, content of organic matter
Management considerations:
- Stones on the surface and cobblestones in the surface layer interfere with the use of tillage, planting, and harvesting equipment. Removing the stones and cobblestones can minimize wear on equipment.
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Seasonal wetness
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Seasonal wetness, slope
Management considerations:
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

74D—Schweitzer-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very stony

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines over igneous and metamorphic bedrock
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 8 to 300 acres

Typical Profile

Schweitzer
Surface layer:
0 to 1 inch—black cobbly very fine sandy loam
Subsurface layer:
1 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 15 inches—dark reddish brown cobbly very fine sandy loam
15 to 21 inches—brown cobbly very fine sandy loam
21 to 61 inches—reddish brown, very firm very cobbly sandy loam and very cobbly loamy sand
Substratum:
61 to 80 inches—reddish brown very cobbly loamy sand

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam

Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Schweitzer—very deep; Michigamme—moderately deep to igneous or metamorphic bedrock
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Schweitzer—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Michigamme—moderate
Available water capacity: Low
Drainage class: Schweitzer—well drained; Michigamme—well drained
Seasonal high water table: More than 6 feet
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Schweitzer soil and similar soils: 40 to 60 percent
Michigamme soil and similar soils: 15 to 30 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the major soils
- The moderately well drained Dishno and Gogebic soils in areas that have slopes of less than 18 percent
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Michigamme soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.

- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The areas of rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope, depth to bedrock
Management considerations:
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas of this map unit that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.
- In areas of the Michigamme soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Slope, restricted permeability, depth to bedrock
Management considerations:
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas of this map unit that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.
- In areas of the Schweitzer soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Areas of the Michigamme soil are generally unsuited to use as sites for septic tank absorption fields because of the limited depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

74F—Schweitzer-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very stony

Setting

Landform: Very hilly areas on bedrock-controlled moraines over igneous and metamorphic bedrock
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 6 to 900 acres

Typical Profile

Schweitzer
Surface layer:
0 to 1 inch—black cobbly very fine sandy loam
Subsurface layer:
1 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 15 inches—dark reddish brown cobbly very fine sandy loam
15 to 21 inches—brown cobbly very fine sandy loam
21 to 61 inches—reddish brown, very firm very cobbly sandy loam and very cobbly loamy sand
Substratum:
61 to 80 inches—reddish brown very cobbly loamy sand

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Schweitzer—very deep; Michigamme—moderately deep to igneous or metamorphic bedrock
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Schweitzer—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Michigamme—moderate
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Schweitzer—rapid; Michigamme—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Schweitzer soil and similar soils: 40 to 60 percent
Michigamme soil and similar soils: 15 to 30 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska soils in landscape positions similar to those of the major soils
- The moderately well drained Gogebic and Dishno soils in areas that have slopes of less than 18 percent
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Michigamme soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily.
- Rock outcrops and stones may interfere with the use of harvesting equipment and the placement of haul roads.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

76C—Garlic-Alcona-Voelker complex, 1 to 12 percent slopes, dissected

Setting

Landform: Nearly level to moderately sloping areas on dissected moraines
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are 50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 10 to 470 acres

Typical Profile

Garlic

Organic mat:
0 to 1 inch—black, well decomposed leaf litter
Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand
Substratum:
46 to 80 inches—brown fine sand

Alcona

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand
Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand and fine sandy loam and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Voelker

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark gray fine sand
Subsurface layer:
5 to 11 inches—reddish gray fine sand
Subsoil:
11 to 23 inches—dark reddish brown and reddish brown, strongly cemented fine sand
23 to 31 inches—brown, moderately cemented fine sand
31 to 39 inches—brown loamy very fine sand and reddish brown very fine sandy loam
Substratum:
39 to 54 inches—stratified, reddish brown loamy very fine sand, very fine sandy loam, and silt loam
54 to 80 inches—stratified, brown sand, very fine sand, and silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Alcona—moderate; Voelker—rapid in the surface layer and subsurface layer, moderate or moderately rapid in the upper part of the subsoil, rapid in the lower part of the subsoil, and moderately slow in the substratum
Available water capacity: Garlic—low; Alcona and Voelker—moderate
Drainage class: Well drained
Surface runoff class: Garlic and Voelker—very slow; Alcona—slow
Flooding: None

Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Garlic and Voelker—severe; Alcona—moderate

Map Unit Composition

Garlic soil and similar soils: 45 to 65 percent
Alcona soil and similar soils: 15 to 25 percent
Voelker soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines
- The moderately well drained Paquin, Munising, and Fence soils in landscape positions similar to those of the major soils

Similar components:
- Garlic soils that have more gravel
- Alcona soils that are silt loam in the lower part of the subsoil and in the substratum

Use and Management

Land use: Dominant use—woodland; other uses—building site development

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Garlic and Voelker soils, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, restricted permeability, slope
Management considerations:
- The poor filtering capacity of the Garlic soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in the Alcona and Voelker soils.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption fields function properly.

76E—Garlic-Alcona-Voelker complex, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel. They are 10 to 30 feet deep and 20 to 100 feet wide and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 400 acres

Typical Profile

Garlic
Organic mat:
0 to 1 inch—black, well decomposed leaf litter
Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand
Substratum:
46 to 80 inches—brown fine sand

Alcona
Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand
Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand and fine sandy loam and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Voelker
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark gray fine sand
Subsurface layer:
5 to 11 inches—reddish gray fine sand
Subsoil:
11 to 23 inches—dark reddish brown and reddish brown, strongly cemented fine sand
23 to 31 inches—brown, moderately cemented fine sand
31 to 39 inches—brown loamy very fine sand and reddish brown very fine sandy loam

Substratum:
39 to 54 inches—stratified, reddish brown loamy very fine sand, very fine sandy loam, and silt loam
54 to 80 inches—stratified, brown sand, very fine sand, and silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Alcona—moderate; Voelker—rapid in the surface layer and subsurface layer, moderate or moderately rapid in the upper part of the subsoil, rapid in the lower part of the subsoil, and moderately slow in the substratum
Available water capacity: Garlic—low; Alcona and Voelker—moderate
Drainage class: Well drained
Surface runoff class: Garlic and Voelker—slow; Alcona—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Garlic and Voelker—severe; Alcona—moderate

Map Unit Composition

Garlic soil and similar soils: 45 to 65 percent
Alcona soil and similar soils: 15 to 25 percent
Voelker soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines
- The well drained Frohling soils in landscape positions similar to those of the major soils

Similar components:
- Garlic soils that have more gravel
- Alcona soils that are silt loam in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- In areas of the Garlic and Voelker soils, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized, and skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, restricted permeability, slope
Management considerations:
- The poor filtering capacity of the Garlic soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in the Alcona and Voelker soils.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to septic tank absorption fields.

76F—Garlic-Alcona-Voelker complex, 15 to 70 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 1,600 acres

Typical Profile

Garlic
Organic mat:
0 to 1 inch—black, well decomposed leaf litter
Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand
Substratum:
46 to 80 inches—brown fine sand

Alcona
Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand

Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand and fine sandy loam and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Voelker
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark gray fine sand
Subsurface layer:
5 to 11 inches—reddish gray fine sand
Subsoil:
11 to 23 inches—dark reddish brown and reddish brown, strongly cemented fine sand
23 to 31 inches—brown, moderately cemented fine sand
31 to 39 inches—brown loamy very fine sand and reddish brown very fine sandy loam
Substratum:
39 to 54 inches—stratified, reddish brown loamy very fine sand, very fine sandy loam, and silt loam
54 to 80 inches—stratified, brown sand, very fine sand, and silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Alcona—moderate; Voelker—rapid in the surface layer and subsurface layer, moderate or moderately rapid in the upper part of the subsoil, rapid in the lower part of the subsoil, and moderately slow in the substratum
Available water capacity: Garlic—low; Alcona and Voelker—moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Garlic and Voelker—severe; Alcona—moderate

Map Unit Composition

Garlic soil and similar soils: 45 to 65 percent
Alcona soil and similar soils: 15 to 25 percent
Voelker soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling soils in landscape positions similar to those of the major soils
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines

Similar components:
- Alcona soils that are silt loam in the lower part of the subsoil and in the substratum
- Garlic soils that have more gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines.
- In areas of the Garlic and Voelker soils, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

77D—Garlic-Alcona-Voelker complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 200 acres

Typical Profile

Garlic
Organic mat:
0 to 1 inch—black, well decomposed leaf litter
Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand

Substratum:
46 to 80 inches—brown fine sand

Alcona
Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand
Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand and fine sandy loam and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Voelker
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark gray fine sand
Subsurface layer:
5 to 11 inches—reddish gray fine sand
Subsoil:
11 to 23 inches—dark reddish brown and reddish brown, strongly cemented fine sand
23 to 31 inches—brown, moderately cemented fine sand
31 to 39 inches—brown loamy very fine sand and reddish brown very fine sandy loam
Substratum:
39 to 54 inches—stratified, reddish brown loamy very fine sand, very fine sandy loam, and silt loam
54 to 80 inches—stratified, brown sand, very fine sand, and silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Alcona—moderate; Voelker—rapid in the surface layer and subsurface layer, moderate or moderately rapid in the upper part of the subsoil, rapid in the lower part of the subsoil, and moderately slow in the substratum
Available water capacity: Garlic—low; Alcona and Voelker—moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Garlic and Voelker—severe; Alcona—moderate

Map Unit Composition

Garlic soil and similar soils: 30 to 50 percent
Alcona soil and similar soils: 15 to 35 percent
Voelker soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Alcona soils that are silt loam in the lower part of the subsoil and in the substratum
- Garlic soils that have more gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Garlic and Voelker soils, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, restricted permeability, slope
Management considerations:
- The poor filtering capacity of the Garlic soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Alcona and Voelker soils.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

77E—Garlic-Alcona-Voelker complex, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 150 acres

Typical Profile

Garlic
Organic mat:
0 to 1 inch—black, well decomposed leaf litter

Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand
Substratum:
46 to 80 inches—brown fine sand

Alcona
Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 9 inches—brown loamy very fine sand
Subsoil:
9 to 18 inches—dark brown very fine sandy loam
18 to 26 inches—brown fine sandy loam
26 to 49 inches—reddish brown fine sandy loam and brown loamy fine sand
Substratum:
49 to 63 inches—stratified, reddish brown loamy sand and fine sandy loam and reddish gray very fine sandy loam
63 to 80 inches—stratified, reddish brown very fine sand and loamy very fine sand

Voelker
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark gray fine sand
Subsurface layer:
5 to 11 inches—reddish gray fine sand
Subsoil:
11 to 23 inches—dark reddish brown and reddish brown, strongly cemented fine sand
23 to 31 inches—brown, moderately cemented fine sand
31 to 39 inches—brown loamy very fine sand and reddish brown very fine sandy loam
Substratum:
39 to 54 inches—stratified, reddish brown loamy very fine sand, very fine sandy loam, and silt loam
54 to 80 inches—stratified, brown sand, very fine sand, and silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Alcona—moderate; Voelker—rapid in the surface layer and subsurface layer, moderate or moderately rapid in the upper part of the subsoil, rapid in the lower part of the subsoil, and moderately slow in the substratum
Available water capacity: Garlic—low; Alcona and Voelker—moderate
Drainage class: Well drained
Surface runoff class: Garlic and Voelker—slow; Alcona—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Garlic and Voelker—severe; Alcona—moderate

Map Unit Composition

Garlic soil and similar soils: 30 to 50 percent
Alcona soil and similar soils: 15 to 35 percent
Voelker soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Alcona soils that are silt loam in the lower part of the subsoil and in the substratum
- Garlic soils that have more gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- In areas of the Garlic and Voelker soils, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

78C—Keweenaw-Kalkaska complex, 1 to 12 percent slopes, dissected

Setting

Landform: Nearly level to moderately sloping areas on dissected moraines
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are

50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 10 to 1,100 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 80 inches—reddish brown loamy sand and light reddish brown sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 40 to 55 percent
Kalkaska soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising and Yalmer soils and the excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that have more gravel
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, plant competition, seedling mortality

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Carefully managed reforestation helps to control undesirable understory plants.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development

Major management concerns: Cutbanks caving, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, slope

Management considerations:

- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption fields function properly.

78E—Keweenaw-Kalkaska complex, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on dissected moraines

Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.

Shape of areas: Irregular

Size of areas: 10 to 110 acres

Typical Profile

Keweenaw

Surface layer:

0 to 1 inch—black loamy sand

Subsurface layer:

1 to 3 inches—reddish brown loamy sand

Subsoil:

3 to 25 inches—dark reddish brown and reddish brown loamy sand

25 to 80 inches—reddish brown loamy sand and light reddish brown sand

Kalkaska

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Keweenaw—medium; Kalkaska—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 40 to 55 percent
Kalkaska soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines
- The well drained Frohling and Voelker soils and the excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that are gravelly sand in the substratum
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
• The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
• In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
• Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

78F—Keweenaw-Kalkaska complex, 15 to 60 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 1,100 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 80 inches—reddish brown loamy sand and light reddish brown sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand

Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 40 to 55 percent
Kalkaska soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines
- The well drained Frohling and Voelker soils and the excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that have more gravelly sand in the substratum
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes can reduce the hazard of erosion.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope

Management considerations:
• Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
• Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

79B—Keweenaw-Munising complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains
Shape of areas: Irregular
Size of areas: 5 to 200 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 80 inches—reddish brown loamy sand and light reddish brown sand

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Keweenaw—well drained; Munising—moderately well drained
Surface runoff class: Keweenaw—very slow; Munising—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—slight in areas of the Keweenaw soil and moderate in areas of the Munising soil
Hazard of soil blowing: Moderate

Map Unit Composition

Keweenaw soil and similar soils: 45 to 60 percent
Munising soil and similar soils: 25 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:

- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:

- Munising soils that have a substratum of silt loam
- Keweenaw soils that are sand throughout

Use and Management

Land use: Dominant use—woodland; other uses—pasture, building site development

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:

- In areas of the Munising soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- In areas of the Munising soil, the seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has adequate snow cover.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Pasture
Major management concerns: Erosion, soil compaction
Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Munising soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability

Management considerations:
- In areas of the Munising soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Munising soil.

80B—Sayner-Rubicon complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash plains and outwash terraces
Shape of areas: Irregular
Size of areas: 12 to 500 acres

Typical Profile

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—stratified, light yellowish brown sand and gravelly sand

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Sayner—very low; Rubicon—low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Sayner—moderate; Rubicon—severe

Map Unit Composition

Sayner soil and similar soils: 35 to 50 percent
Rubicon soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The moderately well drained Croswell soils in the slightly lower positions on the landscape

Similar components:
- Sayner soils that have a surface layer of sandy loam
- Rubicon soils that are fine sand throughout

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.

80D—Sayner-Rubicon complex, 6 to 18 percent slopes

Setting

Landscape position: Gently rolling and rolling areas on outwash plains and outwash terraces
Shape of areas: Irregular
Size of areas: 9 to 100 acres

Typical Profile

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—stratified, light yellowish brown sand and gravelly sand

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Sayner—very low; Rubicon—low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Sayner—moderate; Rubicon—severe

Map Unit Composition

Sayner soil and similar soils: 35 to 50 percent
Rubicon soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The moderately well drained Croswell soils in areas that have slopes of less than 4 percent

Similar components:
- Sayner soils that have a surface layer of sandy loam
- Rubicon soils that are fine sand throughout

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope

Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

80E—Sayner-Rubicon complex, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash plains and outwash terraces
Shape of areas: Irregular
Size of areas: 10 to 90 acres

Typical Profile

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—stratified, light yellowish brown sand and gravelly sand

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Sayner—very low; Rubicon—low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Sayner—moderate; Rubicon—severe

Map Unit Composition

Sayner soil and similar soils: 35 to 50 percent
Rubicon soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The moderately well drained Croswell soils in areas that have slopes of less than 4 percent

Similar components:
- Sayner soils that have a surface layer of sandy loam
- Rubicon soils that are fine sand throughout

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

81B—Pelissier gravelly sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 400 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed leaf litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 80 inches—strong brown and reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsoil and very rapid in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils in landscape positions similar to those of the Pelissier soil
- The moderately well drained Farquar soils in the slightly lower positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have less gravel

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity

Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

81D—Pelissier gravelly sandy loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces and outwash plains
Shape of areas: Oval or elongated
Size of areas: 9 to 80 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed leaf litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 80 inches—strong brown and reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsoil and very rapid in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils in landscape positions similar to those of the Pelissier soil
- The moderately well drained Farquar soils in the slightly lower positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have less gravel

Use and Management

Woodland
Major management concerns: Erosion hazard

Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

81E—Pelissier gravelly sandy loam, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash terraces, eskers, kames, and moraines
Shape of areas: Oval or elongated
Size of areas: 6 to 60 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed leaf litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 80 inches—strong brown and reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsoil and very rapid in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils in landscape positions similar to those of the Pelissier soil
- The moderately well drained Farquar soils in areas that have slopes of less than 4 percent
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have less gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography. The grade should be kept as low as possible.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

84D—Rubicon-Ishpeming-Rock outcrop complex, 6 to 25 percent slopes

Setting

Landform: Gently rolling and rolling outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 150 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand

Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Ishpeming
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown sand
Subsoil:
6 to 13 inches—dark brown and brown sand
13 to 24 inches—strong brown sand
Substratum:
24 to 38 inches—brown loamy fine sand
Bedrock:
38 inches—granite

Soil Properties and Qualities

Depth class: Rubicon—very deep; Ishpeming—moderately deep to igneous or metamorphic bedrock
Permeability: Rapid
Available water capacity: Rubicon—low; Ishpeming—very low
Drainage class: Rubicon—excessively drained; Ishpeming—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 45 to 65 percent
Ishpeming soil and similar soils: 15 to 30 percent
Rock outcrop: 15 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches
- Rubicon soils that are fine sand throughout or are gravelly sand in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on

the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized and skid roads should be built on the contour or on the gentler slopes.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Ishpeming soil, buildings should be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, depth to bedrock, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- Areas of the Ishpeming soil are generally unsuited to use as sites for septic tank absorption fields because of the slope and the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies.
- In areas of the Rubicon soil that have slopes of less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

84F—Rubicon-Ishpeming-Rock outcrop complex, 25 to 60 percent slopes

Setting

Landform: Very hilly outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Ishpeming
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown sand
Subsoil:
6 to 13 inches—dark brown and brown sand
13 to 24 inches—strong brown sand
Substratum:
24 to 38 inches—brown loamy fine sand
Bedrock:
38 inches—granite

Soil Properties and Qualities

Depth class: Rubicon—very deep; Ishpeming—moderately deep to igneous or metamorphic bedrock
Permeability: Rapid
Available water capacity: Rubicon—low; Ishpeming—very low
Drainage class: Rubicon—excessively drained; Ishpeming—somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 45 to 65 percent
Ishpeming soil and similar soils: 15 to 30 percent
Rock outcrop: 15 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches
- Rubicon soils that are fine sand throughout or that have a substratum of gravelly sand

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality

Management considerations:

- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because loose sand and the slope can hinder the traction of wheeled equipment, logging roads should be stabilized and skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Slope

Management considerations:

- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope

Management considerations:

- Because of the slope, this map is generally unsuited to use as a site for septic tank absorption fields.

85A—Solona fine sandy loam, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on drumlinized ground moraines
Shape of areas: Elongated or irregular
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 6 inches—black fine sandy loam
Subsurface layer:
6 to 18 inches—brown fine sandy loam
Subsoil:
18 to 25 inches—brown, mottled fine sandy loam
Substratum:
25 to 80 inches—brown, mottled gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate

Available water capacity: Moderate
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Solona soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet soils on low ridges and knolls
- The poorly drained Ensley soils in the slightly lower positions on the landscape
- The moderately well drained Mashek soils in the slightly higher positions on the landscape

Similar components:
- Soils that have a substratum of sand or gravelly sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Cropland
Major management concerns: Seasonal wetness, nutrient loss, tilth
Management considerations:
- Ensuring that the nutrients in manure and fertilizer applications do not exceed the plant nutrient requirements can help to protect the ground water.
- Subsurface drains can reduce the wetness if a suitable outlet is available.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.

Pasture
Major management concerns: Seasonal wetness, surface compaction
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Seasonal wetness

Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

86B—Mashek fine sandy loam, 0 to 4 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlinized ground moraines
Shape of areas: Irregular
Size of areas: 5 to 140 acres

Typical Profile

Surface layer:
0 to 3 inches—dark brown fine sandy loam
Subsoil:
3 to 17 inches—dark brown fine sandy loam
17 to 27 inches—brown loamy fine sand and reddish brown fine sandy loam
27 to 38 inches—reddish brown cobbly fine sandy loam
38 to 43 inches—brown, mottled cobbly fine sandy loam
Substratum:
43 to 80 inches—brown, mottled, very firm cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil, moderately slow in the lower part of the subsoil, and very slow in the substratum
Available water capacity: Moderate
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Mashek soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet soils in the slightly higher positions on the landscape
- The somewhat poorly drained Solona soils in the lower positions on the landscape
- The poorly drained Ensley soils in depressions and drainageways

Similar components:
- Soils that have a substratum of sand or gravelly sand

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland

Major management concerns: Equipment limitations, plant competition

Management considerations:

- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Special harvest methods may be needed to control undesirable species.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be necessary.

Cropland

Major management concerns: Seasonal wetness, content of organic matter, tilth, compaction

Management considerations:

- A subsurface drainage system can lower the water table.
- Because of the restricted permeability of the soil, subsurface drains should be narrowly spaced.
- Keeping crop residue on the surface, regularly adding other organic material, and applying a system of no-till planting increase the content of organic matter.
- Applying a system of conservation tillage and deferring tillage when the soil is wet help to prevent the deterioration of tilth.

Pasture

Major management concerns: Seasonal wetness, compaction, overgrazing

Management considerations:

- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Seasonal wetness, restricted permeability

Management considerations:

- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

87B—Cunard fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on ground moraines

Shape of areas: Irregular

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 4 inches—black fine sandy loam
Subsurface layer:
4 to 6 inches—brown fine sandy loam
Subsoil:
6 to 10 inches—brown fine sandy loam
10 to 19 inches—dark brown loam
Substratum:
19 to 27 inches—brown gravelly fine sandy loam
Bedrock:
27 inches—pale brown dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep to dolomitic sandstone, dolomite, or limestone
Permeability: Moderate
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Cunard soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet and Summerville soils in landscape positions similar to those of the Cunard soil
- The poorly drained Nahma soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 40 inches

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, tilth, low content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Compaction, overgrazing
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Depth to bedrock
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Depth to bedrock
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

88—Cathro-Ensley mucks

Setting

Landform: Depressions and drainageways on fluted and drumlinized ground moraines
Shape of areas: Elongated
Size of areas: 10 to 1,000 acres

Typical Profile

Cathro
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 31 inches—black muck
Substratum:
31 to 80 inches—dark grayish brown fine sandy loam

Ensley
Surface layer:
0 to 5 inches—black muck
Subsurface layer:
5 to 7 inches—black mucky loam

Subsoil:
7 to 19 inches—brown, mottled fine sandy loam
Substratum:
19 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Cathro—moderately slow to moderately rapid in the surface and subsurface tiers and moderately slow in the substratum; Ensley—moderate
Available water capacity: Cathro—very high; Ensley—moderate
Drainage class: Cathro—very poorly drained; Ensley—poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Cathro soil and similar soils: 45 to 65 percent
Ensley soil and similar soils: 20 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Emmet and Onaway soils on knolls and ridges
- The somewhat poorly drained Solona soils in the slightly higher positions on the landscape

Similar components:
- Soils that have bedrock at a depth of 40 to 80 inches
- Ensley soils that have a substratum of gravelly sand
- Cathro soils in which the organic layer is more than 51 inches thick

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

89B—Emmet-Solona fine sandy loams, 0 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Elongated or irregular
Size of areas: 10 to 50 acres

Typical Profile

Emmet
Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—reddish brown gravelly fine sandy loam

Solona
Surface layer:
0 to 6 inches—black fine sandy loam
Subsurface layer:
6 to 18 inches—brown fine sandy loam
Subsoil:
18 to 25 inches—brown, mottled fine sandy loam
Substratum:
25 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Emmet—moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum; Solona—moderate
Available water capacity: Moderate
Drainage class: Emmet—well drained; Solona—somewhat poorly drained
Surface runoff class: Emmet—slow; Solona—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Emmet soil and slight in areas of the Solona soil
Hazard of soil blowing: Moderate

Map Unit Composition

Emmet soil and similar soils: 50 to 70 percent
Solona soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Ensley soils in depressions and drainageways
- The moderately well drained Mashek soils in areas that have slopes of less than 4 percent
- The well drained Nadeau soils in landscape positions similar to those of the major soils

Similar components:
- Emmet soils that are sand or loamy sand in the surface layer and the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- In areas of the Emmet soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily.
- Year-round logging roads require roadfill and a gravel base. Culverts are needed to maintain the natural drainage system.
- In areas of the Solona soil, the seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Landing sites generally can be used only during the driest time of the year.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, tilth, content of organic matter, seasonal wetness
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.
- Subsurface drains can reduce the wetness if a suitable outlet is available.

Pasture
Major management concerns: Surface compaction, seasonal wetness, overgrazing
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Seasonal wetness

Management considerations:

- In areas of the Solona soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields

Major management concerns: Seasonal wetness, restricted permeability

Management considerations:

- In areas of the Solona soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

90B—Emmet-Escanaba complex, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 15 to 300 acres

Typical Profile

Emmet

Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Escanaba

Organic mat:
0 to 1 inch—partially decomposed forest litter
Surface layer:
1 to 3 inches—black loamy fine sand
Subsurface layer:
3 to 6 inches—reddish gray loamy fine sand
Subsoil:
6 to 26 inches—dark reddish brown and brown loamy fine sand
26 to 42 inches—reddish brown loamy fine sand and dark reddish brown fine sandy loam
Substratum:
42 to 80 inches—reddish brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Emmet—moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum; Escanaba—moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Moderate

Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Emmet soil and slight in areas of the Escanaba soil
Hazard of soil blowing: Emmet—moderate; Escanaba—severe

Map Unit Composition

Emmet soil and similar soils: 45 to 65 percent
Escanaba soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Solona and poorly drained Ensley soils in depressions and drainageways
- The somewhat excessively drained Mancelona soils in landscape positions similar to those of the major soils
- The well drained Rousseau soils in landscape positions similar to those of the major soils

Similar components:
- Emmet soils that have a subsoil of sandy clay loam

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- In areas of the Emmet soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Loose sand in areas of the Escanaba soil can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, droughtiness, tilth, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.

- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Erosion, surface compaction
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability
Management considerations:
- In areas of the Emmet soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

90D—Emmet-Escanaba complex, 6 to 18 percent slopes

Setting

Landform: Moderately sloping and strongly sloping areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 10 to 150 acres

Typical Profile

Emmet
Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Escanaba
Organic mat:
0 to 1 inch—partially decomposed forest litter
Surface layer:
1 to 3 inches—black loamy fine sand

Subsurface layer:
3 to 6 inches—reddish gray loamy fine sand
Subsoil:
6 to 26 inches—dark reddish brown and brown loamy fine sand
26 to 42 inches—reddish brown loamy fine sand and dark reddish brown fine sandy loam
Substratum:
42 to 80 inches—reddish brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Emmet—moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum; Escanaba—moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe in areas of the Emmet soil and moderate in areas of the Escanaba soil
Hazard of soil blowing: Emmet—moderate; Escanaba—severe

Map Unit Composition

Emmet soil and similar soils: 45 to 65 percent
Escanaba soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Solona and poorly drained Ensley soils in depressions and drainageways
- The somewhat excessively drained Mancelona soils in landscape positions similar to those of the major soils
- The well drained Rousseau soils in landscape positions similar to those of the major soils

Similar components:
- Emmet soils that have a subsoil of sandy clay loam

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.

- Loose sand in areas of the Escanaba soil can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, droughtiness, tilth, content of organic matter

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture

Major management concerns: Erosion, surface compaction

Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Restricted permeability, slope

Management considerations:

- In areas of the Emmet soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

91B—Onaway-Nadeau fine sandy loams, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently sloping areas on drumlins and ground moraines
Shape of areas: Oval or elongated
Size of areas: 5 to 75 acres

Typical Profile

Onaway
Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—brown fine sandy loam
13 to 18 inches—dark brown sandy clay loam
18 to 25 inches—brown gravelly fine sandy loam
Substratum:
25 to 80 inches—light brown gravelly fine sandy loam

Nadeau
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—black fine sandy loam
Subsurface layer:
5 to 7 inches—brown fine sandy loam
Subsoil:
7 to 10 inches—brown gravelly fine sandy loam
10 to 23 inches—reddish brown gravelly fine sandy loam and very gravelly sandy loam
23 to 36 inches—brown very gravelly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Onaway—moderate in the surface layer and subsoil and moderately slow in the substratum; Nadeau—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Onaway—moderate; Nadeau—low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Onaway soil and similar soils: 45 to 65 percent
Nadeau soil and similar soils: 20 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Ensley soils in depressions and drainageways
- The moderately well drained Northland soils in the slightly lower positions on the landscape

Similar components:
- Onaway soils that are fine sandy loam in the lower part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, droughtiness, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, crop residue management, stripcropping, vegetative barriers, and cover crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Erosion, surface compaction
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Caving of cutbanks is a concern affecting shallow excavations. Trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, poor filtering capacity

Management considerations:
- In areas of the Onaway soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- The poor filtering capacity in areas of the Nadeau soil can result in the pollution of ground water.

92A—Ensley-Solona complex, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on drumlinized and fluted ground moraines
Shape of areas: Elongated
Size of areas: 8 to 200 acres

Typical Profile

Ensley
Surface layer:
0 to 5 inches—black muck
Subsurface layer:
5 to 7 inches—black mucky loam
Subsoil:
7 to 19 inches—brown, mottled fine sandy loam
Substratum:
19 to 80 inches—brown gravelly fine sandy loam

Solona
Surface layer:
0 to 6 inches—black fine sandy loam
Subsurface layer:
6 to 18 inches—brown fine sandy loam
Subsoil:
18 to 25 inches—brown, mottled fine sandy loam
Substratum:
25 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Ensley—poorly drained; Solona—somewhat poorly drained
Surface runoff class: Ensley—very slow or ponded; Solona—very slow
Flooding: None
Content of organic matter: Ensley—high; Solona—low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Ensley soil and similar soils: 45 to 65 percent
Solona soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Mashek soils on low knolls

- The well drained Emmet soils on hills and knolls
- The very poorly drained Cathro soils in the slightly lower positions on the landscape

Similar components:
- Ensley soils that have a substratum of gravelly sand
- Soils that have bedrock at a depth of 40 to 80 inches

Use and Management

Land use: Dominant use—woodland; other use—pasture

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover (fig. 13).
- Landing sites generally can be used only during the driest time of the year.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Special harvest methods may be needed to control undesirable plants.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Pasture
Major management concerns: Surface compaction, wetness
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Seasonal wetness, ponding
Management considerations:
- In areas of the Solona soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Areas of the Ensley soil are generally unsuited to building site development because of ponding.

Septic tank absorption fields
Major management concerns: Seasonal wetness, ponding
Management considerations:
- In areas of the Solona soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Areas of the Ensley soil are generally unsuited to use as sites for septic tank absorption fields because of ponding.

93—Tawas-Deford mucks

Setting

Landform: Depressions and drainageways on outwash plains, till-floored lake plains, and moraines

Figure 13.—Skidder ruts in an area of Ensley-Solona complex, 0 to 3 percent slopes. Restricting the use of equipment to periods when the ground is relatively dry or is frozen helps to prevent the formation of ruts.

Shape of areas: Elongated
Size of areas: 5 to 300 acres

Typical Profile

Tawas
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 25 inches—black muck

Substratum:
25 to 80 inches—grayish brown sand

Deford
Surface layer:
0 to 6 inches—black muck
Substratum:
6 to 30 inches—grayish brown and brown, mottled sand
30 to 80 inches—very dark gray sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Tawas—moderately slow to moderately rapid in the surface and subsurface tiers and rapid in the substratum; Deford—rapid
Available water capacity: Tawas—very high; Deford—low
Drainage class: Tawas—very poorly drained; Deford—poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Tawas soil and similar soils: 45 to 65 percent
Deford soil and similar soils: 20 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Rousseau and excessively drained Rubicon soils on hills and knolls
- The somewhat poorly drained Au Gres and moderately well drained Croswell soils in the slightly higher positions on the landscape

Similar components:
- Tawas soils in which the organic layers are more than 51 inches thick
- Tawas soils that have a loamy substratum
- Deford soils that have a substratum of gravelly sand or gravelly fine sandy loam

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding, excess humus
Management considerations:
- Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, excess humus
Management considerations:
- Because of ponding and low strength, these soils are generally unsuited to use as sites for septic tank absorption fields.

94B—Keweenaw-Kalkaska complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains and moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 200 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 36 inches—reddish brown loamy sand and light reddish brown sand
36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 35 to 50 percent

Kalkaska soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising and Yalmer soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that are fine sand
- Kalkaska soils that have more than 50 percent ortstein in the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.

94D—Keweenaw-Kalkaska complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains and moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 250 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand

25 to 36 inches—reddish brown loamy sand and light reddish brown sand
36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 35 to 50 percent
Kalkaska soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that are fine sand
- Kalkaska soils that have more than 50 percent ortstein in the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

94E—Keweenaw-Kalkaska complex, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on till-floored lake plains and moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 75 acres

Typical Profile

Keweenaw
Surface layer:
0 to 1 inch—black loamy sand
Subsurface layer:
1 to 3 inches—reddish brown loamy sand
Subsoil:
3 to 25 inches—dark reddish brown and reddish brown loamy sand
25 to 36 inches—reddish brown loamy sand and light reddish brown sand
36 to 80 inches—firm, reddish brown loamy sand and light reddish brown sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 35 to 50 percent
Kalkaska soil and similar soils: 35 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways
- The excessively drained Waiska soils in landscape positions similar to those of the major soils

Similar components:
- Kalkaska soils that are fine sand
- Kalkaska soils that have more than 50 percent ortstein in the subsoil
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes and should be stabilized.
- Planting seedlings that can withstand the droughty conditions in areas of the Kalkaska soil can lower the seedling mortality rate. Replanting is needed in some areas.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

95B—Liminga fine sand, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains and outwash plains
Shape of areas: Irregular or oval
Size of areas: 10 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—black fine sand
Subsurface layer:
2 to 4 inches—reddish gray fine sand
Subsoil:
4 to 9 inches—dark reddish brown fine sand
9 to 19 inches—reddish brown fine sand
19 to 30 inches—strong brown fine sand
Substratum:
30 to 80 inches—brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Very slow
Flooding: None
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Liminga soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Alcona soils in landscape positions similar to those of the Liminga soil
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are medium sand throughout
- Soils that are loamy in the lower part of the subsoil and in the substratum
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

95D—Liminga fine sand, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains and outwash plains
Shape of areas: Irregular or oval
Size of areas: 10 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—black fine sand
Subsurface layer:
2 to 4 inches—reddish gray fine sand
Subsoil:
4 to 9 inches—dark reddish brown fine sand
9 to 19 inches—reddish brown fine sand
19 to 30 inches—strong brown fine sand
Substratum:
30 to 80 inches—brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Liminga soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Alcona soils in landscape positions similar to those of the Liminga soil
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that are medium sand throughout
- Soils are loamy in the lower part of the subsoil and in the substratum
- Soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns:
Management considerations: Poor filtering capacity, slope
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

100E—Sayner-Rubicon complex, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 10 to 180 acres

Typical Profile

Sayner

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—light yellowish brown, stratified sand and gravelly sand

Rubicon

Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Sayner—medium; Rubicon—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Sayner—moderate; Rubicon—severe

Map Unit Composition

Sayner soil and similar soils: 45 to 65 percent
Rubicon soil and similar soils: 30 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Kinross soils on the bottom of ravines
- The well drained Frohling soils in landscape positions similar to those of the major soils

Similar components:
- Rubicon soils that have loamy bands in the lower part of the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads and

skid roads in the less sloping areas between the ravines and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss and reduce the equipment limitation.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

100F—Sayner-Rubicon complex, 15 to 60 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 40 to 250 acres

Typical Profile

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—light yellowish brown, stratified sand and gravelly sand

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Sayner—moderate; Rubicon—severe

Map Unit Composition

Sayner soil and similar soils: 45 to 65 percent
Rubicon soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres and poorly drained Kinross soils on the bottom of ravines
- The well drained Frohling soils in landscape positions similar to those of the major soils

Similar components:
- Rubicon soils that have loamy bands in the lower part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes reduces the hazard of erosion.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

103D—Rubicon-Ocqueoc-Rock outcrop complex, 6 to 25 percent slopes

Setting

Landform: Gently rolling and rolling terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Ocqueoc
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sand
Subsurface layer:
2 to 7 inches—pinkish gray fine sand
Subsoil:
7 to 27 inches—reddish brown and yellowish red fine sand
Substratum:
27 to 33 inches—dark brown loamy fine sand
33 to 80 inches—stratified, firm, reddish brown very fine sandy loam and light reddish brown loamy very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rubicon—rapid; Ocqueoc—rapid in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum
Available water capacity: Rubicon—low; Ocqueoc—moderate
Drainage class: Rubicon—excessively drained; Ocqueoc—well drained
Surface runoff class: Slow
Flooding: None

Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Rubicon soil and similar soils: 35 to 50 percent
Ocqueoc soil and similar soils: 15 to 30 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Rubicon soils that are fine sand throughout or that have a substratum of gravelly sand
- Soils that have a seasonal high water table at a depth of 40 to 60 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes and should be stabilized.
- The rock outcrop should be considered when locations for roads and landing sites are planned.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, restricted permeability, slope

Management considerations:

- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.
- In areas of the Ocqueoc soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

104C—Fence very fine sandy loam, 1 to 12 percent slopes, dissected

Setting

Landform: Nearly level to moderately sloping, dissected areas on till-floored lake plains

Distinctive landscape features: Dissected uplands with mainly parallel ravines that are 50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.

Shape of areas: Irregular or elongated

Size of areas: 10 to 350 acres

Typical Profile

Surface layer:

0 to 3 inches—very dark gray very fine sandy loam

Subsurface layer:

3 to 7 inches—reddish gray very fine sandy loam

Subsoil:

7 to 16 inches—dark reddish brown and reddish brown very fine sandy loam

16 to 19 inches—yellowish brown loamy very fine sand

19 to 42 inches—reddish brown and red, mottled silt loam and reddish brown very fine sandy loam

Substratum:

42 to 57 inches—stratified, reddish brown, mottled silt loam and very fine sandy loam and red silty clay loam

57 to 80 inches—stratified, reddish brown, mottled silt loam and brown very fine sand

Soil Properties and Qualities

Depth class: Very deep

Permeability: Moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum

Available water capacity: High

Drainage class: Moderately well drained

Surface runoff class: Slow

Flooding: None

Content of organic matter: Low

Hazard of water erosion: Moderate

Hazard of soil blowing: Moderate

Map Unit Composition

Fence soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Sporley, Garlic, and Voelker soils in landscape positions similar to those of the Fence soil
- Somewhat poorly drained and poorly drained, loamy soils on the bottom of ravines

Similar components:
- Soils that have a substratum of sandy loam

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope, wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas. Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Restricted permeability, slope, seasonal wetness
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Mounding or adding suitable fill material helps to raise the absorption field above the water table.

105C—Munising fine sandy loam, 1 to 12 percent slopes, dissected

Setting

Landform: Nearly level to moderately sloping, dissected areas on till-floored lake plains
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are 50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and

have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 550 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Munising soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Skanee and poorly drained Gay soils on the bottom of ravines
- The well drained Frohling soils in areas that have slopes of more than 8 percent
- Soils in areas where surface stones are approximately 3 to 25 feet apart

Similar components:
- Soils that have stratified sand to silt loam in the substratum
- Soils that are sand in the surface layer and the upper part of the subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, seasonal wetness, low content of organic matter
Management considerations:
- Water erosion can be controlled by diversions, crop residue management, contour stripcropping, field stripcropping, cover crops, grassed waterways, conservation tillage, crop rotations that include grasses and legumes, grade-stabilization structures, or a combination of these.
- During wet periods, grassed waterways help to remove surface water.
- Crop residue management, green manure crops, applications of manure, cover crops, and conservation tillage help to maintain or improve tilth and increase the available water capacity and the content of organic matter.

Pasture
Major management concerns: Compaction, seasonal wetness, seasonal droughtiness
Management considerations:
- Restricted grazing during wet periods helps to prevent compaction and poor tilth.
- Proper stocking rates, controlled grazing, and restricted use during dry periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

106B—Sagola-Rubicon complex, 1 to 6 percent slopes, bouldery

Setting

Landform: Gently undulating areas on ground moraines and disintegration moraines
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Sagola
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 5 inches—brown fine sandy loam
Subsoil:
5 to 20 inches—brown fine sandy loam
20 to 56 inches—reddish brown sandy loam and brown loamy sand
Substratum:
56 to 80 inches—strong brown sandy loam

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Sagola—moderate; Rubicon—rapid
Available water capacity: Sagola—moderate; Rubicon—low
Drainage class: Sagola—well drained; Rubicon—excessively drained
Surface runoff class: Sagola—slow; Rubicon—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Sagola soil and slight in areas of the Rubicon soil
Hazard of soil blowing: Sagola—moderate; Rubicon—severe

Map Unit Composition

Sagola soil and similar soils: 50 to 70 percent
Rubicon soil and similar soils: 15 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keweenaw and Escanaba soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Sagola soils that have a substratum of gravelly sand
- Rubicon soils that are fine sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- In areas of the Sagola soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Rubicon soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.

106D—Sagola-Rubicon complex, 6 to 18 percent slopes, bouldery

Setting

Landform: Gently rolling and rolling areas on ground moraines and disintegration moraines
Shape of areas: Irregular
Size of areas: 5 to 400 acres

Typical Profile

Sagola
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 5 inches—brown fine sandy loam
Subsoil:
5 to 20 inches—brown fine sandy loam
20 to 56 inches—reddish brown sandy loam and brown loamy sand
Substratum:
56 to 80 inches—strong brown sandy loam

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Sagola—moderate; Rubicon—rapid
Available water capacity: Sagola—moderate; Rubicon—low
Drainage class: Sagola—well drained; Rubicon—excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe in areas of the Sagola soil and moderate in areas of the Rubicon soil
Hazard of soil blowing: Sagola—moderate; Rubicon—severe

Map Unit Composition

Sagola soil and similar soils: 50 to 70 percent
Rubicon soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keweenaw and Escanaba soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Sagola soils that have a substratum of gravelly sand
- Rubicon soils that are fine sand

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Rubicon soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes. Logging roads and skid roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

107B—Goodman-Sundog silt loams, 1 to 6 percent slopes, bouldery

Setting

Landform: Gently undulating areas on disintegration moraines
Shape of areas: Irregular or oval
Size of areas: 6 to 200 acres

Typical Profile

Goodman
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray silt loam
Subsoil:
4 to 19 inches—brown and strong brown silt loam
19 to 30 inches—brown and reddish brown silt loam
30 to 71 inches—dark reddish brown sandy loam and reddish brown loamy sand
Substratum:
71 to 80 inches—brown loamy sand

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Goodman—moderate in the surface layer and subsoil and moderately rapid in the substratum; Sundog—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the substratum
Available water capacity: Goodman—high; Sundog—moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Goodman soil and similar soils: 50 to 70 percent
Sundog soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Greenwood soils in depressions
- The moderately well drained Wabeno and Chabeneau soils in the slightly lower positions on the landscape
- The well drained Keweenaw soils in landscape positions similar to those of the major soils

Similar components:
- Goodman soils that are sandy loam in the surface layer and the upper part of the subsoil
- Sundog soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are spaced 10 to 60 feet apart

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, droughtiness, content of organic matter, boulders
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.

- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.
- Boulders on the surface interfere with the use of tillage, planting, and harvesting equipment. Removing the boulders may be necessary before areas of this map unit can be used as cropland.

Pasture
Major management concerns: Surface compaction, erosion
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, poor filtering capacity
Management considerations:
- In areas of the Goodman soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.

107D—Goodman-Sundog silt loams, 6 to 18 percent slopes, bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular or oval
Size of areas: 10 to 1,000 acres

Typical Profile

Goodman
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray silt loam
Subsoil:
4 to 19 inches—brown and strong brown silt loam
19 to 30 inches—brown and reddish brown silt loam
30 to 71 inches—dark reddish brown sandy loam and reddish brown loamy sand

Substratum:
71 to 80 inches—brown loamy sand

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Goodman—moderate in the surface layer and subsoil and moderately rapid in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Goodman—high; Sundog—moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Goodman soil and similar soils: 50 to 70 percent
Sundog soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Greenwood soils in depressions
- The moderately well drained Wabeno and Chabeneau soils in areas that have slopes of less than 6 percent
- The well drained Keweenaw soils in landscape positions similar to those of the major soils

Similar components:
- Goodman soils that are sandy loam in the surface layer and the upper part of the subsoil
- Sundog soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are spaced 10 to 60 feet apart

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland

Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, droughtiness, content of organic matter, boulders

Management considerations:

- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.
- Boulders on the surface interfere with the use of tillage, planting, and harvesting equipment. Removing the boulders may be necessary before areas of this map unit can be used as cropland.

Pasture

Major management concerns: Surface compaction, erosion

Management considerations:

- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development

Major management concerns: Cutbanks caving, slope

Management considerations:

- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Restricted permeability, poor filtering capacity, slope

Management considerations:

- In areas of the Goodman soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

107F—Goodman-Sundog silt loams, 18 to 45 percent slopes, bouldery

Setting

Landform: Very hilly areas on disintegration moraines
Shape of areas: Irregular or oval
Size of areas: 10 to 1,000 acres

Typical Profile

Goodman
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray silt loam
Subsoil:
4 to 19 inches—brown and strong brown silt loam
19 to 30 inches—brown and reddish brown silt loam
30 to 71 inches—dark reddish brown sandy loam and reddish brown loamy sand
Substratum:
71 to 80 inches—brown loamy sand

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Goodman—moderate in the surface layer and subsoil and moderately rapid in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Goodman—high; Sundog—moderate
Drainage class: Well drained
Surface runoff class: Rapid
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Goodman soil and similar soils: 50 to 70 percent
Sundog soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Greenwood soils in depressions
- The well drained Keweenaw soils in landscape positions similar to those of the major soils

Similar components:
- Goodman soils that are sandy loam in the surface layer and the upper part of the subsoil
- Sundog soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are spaced 10 to 60 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, erosion hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

108B—Goodman-Sundog-Wabeno silt loams, 1 to 6 percent slopes, bouldery

Setting

Landform: Gently undulating areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Goodman

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray silt loam
Subsoil:
4 to 19 inches—brown and strong brown silt loam
19 to 30 inches—brown and reddish brown silt loam
30 to 71 inches—dark reddish brown sandy loam and reddish brown loamy sand
Substratum:
71 to 80 inches—brown loamy sand

Sundog

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Wabeno

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—gray silt loam
Subsoil:
3 to 23 inches—reddish brown and yellowish red silt loam
23 to 29 inches—brown, mottled silt loam
29 to 57 inches—dark brown and brown, mottled, very firm sandy loam and loamy sand
Substratum:
57 to 80 inches—brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Goodman—moderate in the surface layer and subsoil and moderately rapid in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum; Wabeno—moderate in the surface layer and subsurface layer and the upper part of the subsoil, slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Goodman—high; Sundog and Wabeno—moderate
Drainage class: Goodman and Sundog—well drained; Wabeno—moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Goodman soil and similar soils: 35 to 50 percent
Sundog soil and similar soils: 15 to 30 percent
Wabeno soil and similar soils: 15 to 30 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Greenwood soils in depressions
- The somewhat poorly drained Net soils in depressions and drainageways
- The well drained Keweenaw soils in landscape positions similar to those of the major soils

Similar components:
- Goodman soils that are sandy loam in the surface layer and the upper part of the subsoil
- Sundog soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are spaced 10 to 60 feet apart

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- The seasonal high water table in areas of the Wabeno soil restricts the use of equipment until midsummer, when the soil is dry, or midwinter, when there is adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, droughtiness, content of organic matter, boulders
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.

- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.
- Boulders on the surface interfere with the use of tillage, planting, and harvesting equipment. Removing the boulders may be necessary before areas of this map unit can be used as cropland.

Pasture
Major management concerns: Surface compaction, erosion
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Wabeno soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Restricted permeability, seasonal wetness, poor filtering capacity
Management considerations:
- In areas of the Wabeno soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas of the Wabeno soil, mounding or adding suitable fill material helps to raise the absorption field above the water table.
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.

108D—Goodman-Sundog-Wabeno silt loams, 6 to 18 percent slopes, bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 10 to 160 acres

Typical Profile

Goodman
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray silt loam
Subsoil:
4 to 19 inches—brown and strong brown silt loam
19 to 30 inches—brown and reddish brown silt loam
30 to 71 inches—dark reddish brown sandy loam and reddish brown loamy sand
Substratum:
71 to 80 inches—brown loamy sand

Sundog

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Wabeno

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—gray silt loam
Subsoil:
3 to 23 inches—reddish brown and yellowish red silt loam
23 to 29 inches—brown, mottled silt loam
29 to 57 inches—dark brown and brown, mottled, very firm sandy loam and loamy sand
Substratum:
57 to 80 inches—brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Goodman—moderate in the surface layer and subsoil and moderately rapid in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum; Wabeno—moderate in the surface layer and subsurface layer and the upper part of the subsoil, slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Goodman—high; Sundog and Wabeno—moderate
Drainage class: Goodman and Sundog—well drained; Wabeno—moderately well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Goodman soil and similar soils: 35 to 50 percent
Sundog soil and similar soils: 15 to 30 percent
Wabeno soil and similar soils: 15 to 30 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways
- The very poorly drained Greenwood soils in depressions

Similar components:
- Areas of well drained Wabeno soils
- Goodman soils that are sandy loam in the surface layer and subsoil
- Sundog soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are spaced 10 to 60 feet apart

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- The seasonal high water table in areas of the Wabeno soil restricts the use of equipment until midsummer, when the soil is dry, or midwinter, when there is adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, droughtiness, content of organic matter, boulders
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.
- Boulders on the surface interfere with the use of tillage, planting, and harvesting equipment. Removing the boulders may be necessary before areas of this map unit can be used as cropland.

Pasture
Major management concerns: Surface compaction, erosion

Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Wabeno soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Restricted permeability, seasonal wetness, poor filtering capacity, slope
Management considerations:
- In areas of the Wabeno soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas of the Wabeno soil, mounding or adding suitable fill material helps to raise the absorption field above the water table.
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

109B—Rubicon-Keweenaw complex, 1 to 6 percent slopes, very bouldery

Setting

Landform: Gently undulating areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 150 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Keweenaw
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray cobbly loamy sand
Subsoil:
4 to 12 inches—reddish brown cobbly loamy sand
12 to 23 inches—light brown cobbly sand and yellowish red cobbly loamy sand

23 to 37 inches—brown loamy sand
37 to 80 inches—brown sand and dark brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Rubicon—rapid; Keweenaw—moderately rapid
Available water capacity: Low
Drainage class: Rubicon—excessively drained; Keweenaw—well drained
Surface runoff class: Rubicon—very slow; Keweenaw—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Rubicon—severe; Keweenaw—moderate

Map Unit Composition

Rubicon soil and similar soils: 35 to 55 percent
Keweenaw soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Pelissier and well drained Pence soils in landscape positions similar to those of the major soils
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils in areas where the surface boulders are less than 9 feet apart
- Rubicon soils that are sandy loam in the surface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- In areas of the Rubicon soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity

Management considerations:
- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.

109D—Rubicon-Keweenaw complex, 6 to 18 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 1,000 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Keweenaw
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray cobbly loamy sand
Subsoil:
4 to 12 inches—reddish brown cobbly loamy sand
12 to 23 inches—light brown cobbly sand and yellowish red cobbly loamy sand
23 to 37 inches—brown loamy sand
37 to 80 inches—brown sand and dark brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Rubicon—rapid; Keweenaw—moderately rapid
Available water capacity: Low
Drainage class: Rubicon—excessively drained; Keweenaw—well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Rubicon—severe; Keweenaw—moderate

Map Unit Composition

Rubicon soil and similar soils: 35 to 50 percent
Keweenaw soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Pelissier and well drained Pence soils in landscape positions similar to those of the major soils
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils in areas where the surface boulders are less than 9 feet apart
- Rubicon soils that are sandy loam in the surface layer and the upper part of the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality

Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- In areas of the Rubicon soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development

Major management concerns: Cutbanks caving, slope

Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Poor filtering capacity, slope

Management considerations:
- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

109F—Rubicon-Keweenaw complex, 18 to 45 percent slopes, very bouldery

Setting

Landform: Very hilly areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 400 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Keweenaw
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray cobbly loamy sand
Subsoil:
4 to 12 inches—reddish brown cobbly loamy sand
12 to 23 inches—light brown cobbly sand and yellowish red cobbly loamy sand
23 to 37 inches—brown loamy sand
37 to 80 inches—brown sand and dark brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Rubicon—rapid; Keweenaw—moderately rapid
Available water capacity: Low
Drainage class: Rubicon—excessively drained; Keweenaw—well drained
Seasonal high water table: More than 6 feet
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Rubicon—severe; Keweenaw—moderate

Map Unit Composition

Rubicon soil and similar soils: 35 to 50 percent
Keweenaw soil and similar soils: 30 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Pelissier and well drained Pence soils in landscape positions similar to those of the major soils
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils in areas where the surface boulders are less than 9 feet apart
- Rubicon soils that are sandy loam in the surface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- In areas of the Rubicon soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

110B—Nadeau-Mancelona complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash terraces
Shape of areas: Irregular
Size of areas: 8 to 200 acres

Typical Profile

Nadeau
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—black fine sandy loam
Subsurface layer:
5 to 7 inches—brown fine sandy loam

Subsoil:
7 to 10 inches—brown gravelly fine sandy loam
10 to 23 inches—reddish brown gravelly fine sandy loam and very gravelly sandy loam
23 to 36 inches—brown very gravelly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Mancelona
Surface layer:
0 to 3 inches—black sandy loam
Subsurface layer:
3 to 10 inches—gray loamy sand
Subsoil:
10 to 12 inches—dark reddish brown loamy fine sand
12 to 18 inches—brown loamy fine sand
18 to 33 inches—yellowish brown sand
33 to 37 inches—brown gravelly sandy loam
Substratum:
37 to 80 inches—light yellowish brown and dark yellowish brown, stratified very gravelly sand and sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Nadeau—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum; Mancelona—moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Nadeau—well drained: Mancelona—somewhat excessively drained
Surface runoff class: Nadeau—slow; Mancelona—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Nadeau soil and slight in areas of the Mancelona soil
Hazard of soil blowing: Moderate

Map Unit Composition

Nadeau soil and similar soils: 50 to 75 percent
Mancelona soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Minocqua soils in depressions and drainageways
- The well drained Rousseau and Emmet soils in landscape positions similar to those of the major soils
- The moderately well drained Northland soils in the slightly lower positions on the landscape

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition

Management considerations:
- In areas of the Nadeau soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.

110D—Nadeau-Mancelona complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Nadeau
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—black fine sandy loam
Subsurface layer:
5 to 7 inches—brown fine sandy loam
Subsoil:
7 to 10 inches—brown gravelly fine sandy loam
10 to 23 inches—reddish brown gravelly fine sandy loam and very gravelly sandy loam
23 to 36 inches—brown very gravelly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Mancelona
Surface layer:
0 to 3 inches—black sandy loam
Subsurface layer:
3 to 10 inches—gray loamy sand

Subsoil:
10 to 12 inches—dark reddish brown loamy fine sand
12 to 18 inches—brown loamy fine sand
18 to 33 inches—yellowish brown sand
33 to 37 inches—brown gravelly sandy loam
Substratum:
37 to 80 inches—light yellowish brown and dark yellowish brown, stratified very gravelly sand and sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Nadeau—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum; Mancelona—moderately rapid in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Nadeau—well drained: Mancelona—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe in areas of the Nadeau soil and moderate in areas of the Mancelona soil
Hazard of soil blowing: Moderate

Map Unit Composition

Nadeau soil and similar soils: 50 to 75 percent
Mancelona soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Minocqua soils in depressions and drainageways
- The well drained Rousseau and Emmet soils in landscape positions similar to those of the major soils
- The moderately well drained Northland soils in the lower positions on the landscape

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

111B—Grayling sand, 0 to 4 percent slopes, rocky

Setting

Landform: Nearly level and gently undulating areas on outwash plains
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 20 to 450 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray sand
Subsoil:
3 to 23 inches—brown and strong brown sand
Substratum:
23 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Grayling soil and similar soils: 85 to 95 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Croswell soils in depressions and drainageways

- The somewhat excessively drained Ishpeming soils in landscape positions similar to those of the Grayling soil

Similar components:
- Soils that have a substratum of gravelly sand

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

112D—Keewaydin-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 5 to 600 acres

Typical Profile

Keewaydin
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam

Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Keewaydin—very deep; Michigamme—moderately deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Michigamme—moderate
Available water capacity: Keewaydin—moderate; Michigamme—low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 45 to 60 percent
Michigamme soil and similar soils: 15 to 25 percent
Rock outcrop: 10 to 20 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Witbeck and very poorly drained Cathro soils in depressions and drainageways
- The moderately well drained Champion and Dishno soils in areas that have slopes of less than 18 percent

Similar components:
- Soils that have bedrock at a depth of less than 20 inches
- Keewaydin soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are less than 3 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.

- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Michigamme soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Depth to bedrock, slope
Management considerations:
- In areas of the Michigamme soil, mounding or adding suitable fill material helps to raise the absorption field above the bedrock.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

112F—Keewaydin-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 6 to 1,100 acres

Typical Profile

Keewaydin
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam

Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Keewaydin—very deep; Michigamme—moderately deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Michigamme—moderate
Available water capacity: Keewaydin—moderate; Michigamme—low
Drainage class: Well drained
Surface runoff class: Rapid
Flooding: None
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 45 to 60 percent
Michigamme soil and similar soils: 15 to 25 percent
Rock outcrop: 10 to 20 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Witbeck and very poorly drained Cathro soils in depressions and drainageways
- The moderately well drained Dishno soils in areas that have slopes of less than 18 percent

Similar components:
- Soils that have bedrock at a depth of less than 20 inches
- Keewaydin soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are less than 3 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.

- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

113B—Vanriper very cobbly silt loam, 1 to 6 percent slopes, rocky, very bouldery

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 6 to 80 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 75 to 90 percent

Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Witbeck soils in depressions and drainageways
- The moderately well drained Dishno and Champion soils in landscape positions similar to those of the Vanriper soil

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, seedling mortality, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of the content of cobbles, machine planting is not practical on this soil.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Large stones
Management considerations:
- Because of the content of cobbles, stones, and boulders, excavation is difficult and cutbanks are unstable. Trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, large stones
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Because of the content of cobbles, stones, and boulders, installing septic tank absorption fields may be difficult.

113D—Vanriper very cobbly silt loam, 6 to 18 percent slopes, rocky, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 12 to 300 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter

Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 75 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Dishno and Champion soils in landscape positions similar to those of the Vanriper soil
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of the content of cobbles, stones, and boulders, machine planting is not practical on this soil.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Special harvest methods may be needed to control undesirable plants.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Large stones, slope
Management considerations:
- Because of the content of cobbles, stones, and boulders, excavation is difficult and cutbanks are unstable. Trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Restricted permeability, large stones, slope
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Because of the content of cobbles, stones, and boulders, installing septic tank absorption fields may be difficult.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

113F—Vanriper very cobbly silt loam, 18 to 45 percent slopes, rocky, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 10 to 120 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Rapid
Flooding: None
Content of organic matter: Low

Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 75 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Vanriper soil
- The poorly drained Witbeck soils in depressions and drainageways
- The moderately well drained Champion soils in areas that have slopes of less than 18 percent

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of the slope, special care is needed in designing logging roads and in operating logging equipment. Logging roads should be designed so that they conform with the topography, and the grade should be kept as low as possible.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of the content of cobbles, stones, and boulders, machine planting is not practical on this soil.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

114B—Vanriper very cobbly silt loam, 1 to 6 percent slopes, very bouldery

Setting

Landform: Gently undulating areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 90 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils in landscape positions similar to those of the Vanriper soil
- The poorly drained Witbeck soils in depressions and drainageways
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Large stones and boulders on the surface can hinder harvesting operations and damage equipment.

- Because of the content of cobbles, stones, and boulders, machine planting is not practical on this soil.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Large stones
Management considerations:
- Because of the content of cobbles, stones, and boulders, excavation is difficult and cutbanks are unstable. Trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, large stones
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Because of the content of cobbles, stones, and boulders, installing septic tank absorption fields may be difficult.

114D—Vanriper very cobbly silt loam, 6 to 18 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 500 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils in landscape positions similar to those of the Vanriper soil
- The poorly drained Witbeck soils in depressions and drainageways
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of the content of cobbles, stones, and boulders, machine planting is not practical on this soil.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Large stones and boulders on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Large stones, slope
Management considerations:
- Because of the content of cobbles, stones, and boulders, excavation is difficult and cutbanks are unstable. Trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Restricted permeability, large stones, slope
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Because of the content of cobbles, stones, and boulders, installing septic tank absorption fields may be difficult.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

114F—Vanriper very cobbly silt loam, 18 to 45 percent slopes, very bouldery

Setting

Landform: Very hilly areas on disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 20 to 300 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 3 inches—brown very cobbly silt loam
Subsoil:
3 to 20 inches—dark brown and dark yellowish brown very cobbly very fine sandy loam
Substratum:
20 to 80 inches—olive brown very cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Rapid
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Vanriper soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils in areas that have slopes of less than 18 percent
- The poorly drained Witbeck soils in depressions and drainageways
- The very poorly drained Greenwood soils in depressions

Similar components:
- Soils that have a substratum of stratified sand and gravel

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.

- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

117B—Fence very fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 60 acres

Typical Profile

Surface layer:
0 to 3 inches—very dark gray very fine sandy loam
Subsurface layer:
3 to 7 inches—reddish gray very fine sandy loam
Subsoil:
7 to 16 inches—dark reddish brown and reddish brown very fine sandy loam
16 to 19 inches—yellowish brown loamy very fine sand
19 to 42 inches—reddish brown and red, mottled silt loam and reddish brown very fine sandy loam
Substratum:
42 to 57 inches—stratified, reddish brown, mottled silt loam and very fine sandy loam and red silty clay loam
57 to 80 inches—stratified, reddish brown, mottled silt loam, brown very fine sand, and light brown fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil and moderately slow in the lower part of the subsoil and in the substratum
Available water capacity: High
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Fence soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Sporley and Voelker soils in the slightly higher positions on the landscape
- Poorly drained, loamy soils in depressions and drainageways

Similar components:
- Soils that have a substratum of sandy loam

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, tilth, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Surface compaction, seasonal wetness
Management considerations:
- Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving and seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Restricted permeability, seasonal wetness
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

118A—Croswell-Deford complex, 0 to 3 percent slopes

Setting

Landform: Croswell—nearly level areas on beach ridges; Deford—in the intervening swales
Shape of areas: Irregular or elongated
Size of areas: 10 to 350 acres

Typical Profile

Croswell
Surface layer:
0 to 3 inches—very dark brown sand
Subsurface layer:
3 to 7 inches—pinkish gray sand
Subsoil:
7 to 22 inches—reddish brown and yellowish red sand
22 to 34 inches—strong brown, mottled sand
Substratum:
34 to 80 inches—light brown, mottled sand

Deford
Surface layer:
0 to 6 inches—black muck
Substratum:
6 to 30 inches—grayish brown and brown, mottled sand
30 to 80 inches—dark gray sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Croswell—moderately well drained; Deford—poorly drained
Surface runoff class: Croswell—very slow; Deford—very slow or ponded
Flooding: None
Content of organic matter: Croswell—low; Deford—high
Hazard of water erosion: Slight
Hazard of soil blowing: Croswell—severe; Deford—moderate

Map Unit Composition

Croswell soil and similar soils: 45 to 60 percent
Deford soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Deer Park soils in the higher positions on ridges
- The somewhat poorly drained Au Gres soils in landscape positions similar to those of the major soils
- The very poorly drained Dawson and Tawas soils in depressions, drainageways, and swales

Similar components:
- Soils that have a substratum of gravelly sand
- Croswell soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seasonal wetness, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- In areas of the Croswell soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- In areas of the Croswell soil, planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Deford soil.
- In areas of the Deford soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- Special harvest methods may be needed to control undesirable plants.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, ponding
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Croswell soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Because of ponding, the Deford soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, ponding
Management considerations:
- The poor filtering capacity of the Croswell soil can result in the pollution of ground water.

- In areas of the Croswell soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Because of ponding, the Deford soil is generally unsuited to use as a site for septic tank absorption fields.

119B—Yalmer-Kalkaska complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains
Shape of areas: Irregular
Size of areas: 20 to 150 acres

Typical Profile

Yalmer
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 80 inches—dark reddish gray, mottled, very firm loamy fine sand and reddish brown fine sandy loam

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Kalkaska—rapid
Available water capacity: Low
Drainage class: Yalmer—moderately well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Yalmer soil and similar soils: 45 to 60 percent
Kalkaska soil and similar soils: 25 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Tokiahok soils in the higher positions on the landscape
- The somewhat poorly drained Au Gres soils in the lower depressions and drainageways

Similar components:
- Kalkaska soils that are fine sand throughout
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, seedling mortality, plant competition
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- In areas of the Yalmer soil, equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Yalmer soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, restricted permeability
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- In areas of the Yalmer soil, filling or mounding with suitable material helps to raise the absorption field above the water table. Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

119D—Yalmer-Kalkaska complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains
Shape of areas: Irregular
Size of areas: 25 to 150 acres

Typical Profile

Yalmer

Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 10 inches—reddish gray fine sand

Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 80 inches—dark reddish gray, mottled, very firm loamy fine sand and reddish brown fine sandy loam

Kalkaska

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 6 inches—reddish gray sand

Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand

Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Kalkaska—rapid
Available water capacity: Low
Drainage class: Yalmer—moderately well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Severe

Map Unit Composition

Yalmer soil and similar soils: 45 to 60 percent
Kalkaska soil and similar soils: 25 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Tokiahok soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres soils in depressions and drainageways

Similar components:
- Kalkaska soils that are fine sand
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, seedling mortality, plant competition

Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Yalmer soil, equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope, cutbanks caving, seasonal wetness
Management considerations:
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Yalmer soil, wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, restricted permeability, slope
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- In areas of the Yalmer soil, filling or mounding with suitable material helps to raise the absorption field above the water table. Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

121B—Onota gravelly sandy loam, 1 to 6 percent slopes

Setting

Landform: Nearly level and gently undulating areas on bedrock benches
Shape of areas: Irregular
Size of areas: 7 to 40 acres

Typical Profile

Organic mat:
0 to 1 inch—undecomposed hardwood forest litter
Surface layer:
1 to 2 inches—black gravelly sandy loam
Subsurface layer:
2 to 7 inches—reddish gray gravelly sandy loam

Subsoil:
7 to 10 inches—dark reddish brown gravelly sandy loam
10 to 22 inches—dark reddish brown, firm gravelly sandy loam
Bedrock:
22 inches—dark reddish brown sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Permeability: Moderate
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Onota soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Carlshend and Chocolay soils in landscape positions similar to those of the Onota soil
- The somewhat poorly drained Zeba and poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils in areas where the surface stones are 25 to 75 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, cutbanks caving
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Depth to bedrock
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing

through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

122—Pleine very cobbly muck, very stony

Setting

Landform: Depressions and drainageways on bedrock-controlled moraines
Shape of areas: Elongated or oval
Size of areas: 5 to 90 acres

Typical Profile

Surface layer:
0 to 9 inches—black very cobbly muck
Subsoil:
9 to 20 inches—pinkish gray, mottled, firm very fine sandy loam
20 to 33 inches—reddish brown, mottled fine sandy loam
Substratum:
33 to 80 inches—reddish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate
Available water capacity: Moderate
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Pleine soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Gogebic and somewhat poorly drained Tula soils in the higher positions on the landscape
- The very poorly drained Cathro soils in the slightly lower positions on the landscape

Similar components:
- Soils that are very cobbly or very gravelly in the subsoil and substratum

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.

- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on this soil.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

123A—Tula cobbly very fine sandy loam, 0 to 3 percent slopes, very stony

Setting

Landform: Nearly level areas on bedrock-controlled moraines
Shape of areas: Elongated or irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark reddish gray cobbly very fine sandy loam
Subsurface layer:
5 to 8 inches—light gray cobbly very fine sandy loam
Subsoil:
8 to 20 inches—reddish brown, mottled cobbly very fine sandy loam
20 to 28 inches—dark reddish brown gravelly sandy loam
28 to 37 inches—light reddish brown and reddish brown, mottled, very firm gravelly sandy loam
37 to 62 inches—dark reddish brown, very firm gravelly loam and reddish brown, very firm gravelly sandy loam
Substratum:
62 to 80 inches—reddish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Moderate
Drainage class: Somewhat poorly drained

Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Tula soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Gogebic soils in the higher positions on the landscape
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Soils that contain less than 15 percent rock fragments throughout
- Soils that have sandy textures in the surface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, seedling mortality, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or winter, when the soil has an adequate snow cover.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Trees that can withstand seasonal wetness should be selected for planting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Seasonal wetness, cutbanks caving
Management considerations:
- Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, seasonal wetness
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

124B—Gogebic-Dishno cobbly silt loams, 1 to 6 percent slopes, rocky, very stony

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 5 to 100 acres

Typical Profile

Gogebic
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black cobbly silt loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 13 inches—dark reddish brown cobbly fine sandy loam
13 to 18 inches—reddish brown, firm cobbly sandy loam
18 to 62 inches—reddish brown, very firm very gravelly sandy loam and very gravelly loamy sand
Substratum:
62 to 80 inches—reddish brown very gravelly sandy loam

Dishno
Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Soil Properties and Qualities

Depth class: Gogebic—very deep; Dishno—deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Gogebic—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the middle and lower parts of the subsoil, and moderate in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained

Surface runoff class: Slow
Flooding: None
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Gogebic soil and similar soils: 50 to 70 percent
Dishno soil and similar soils: 20 to 35 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska and well drained Schweitzer soils in landscape positions similar to or slightly higher than those of the major soils
- The somewhat poorly drained Tula and poorly drained Pleine soils in depressions and drainageways

Similar components:
- Soils in areas where the surface stones are 1 to 3 feet apart
- Soils that have bedrock at a depth of less than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has adequate snow cover.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.

Septic tank absorption fields
Major management concerns: Restricted permeability, depth to bedrock, seasonal wetness
Management considerations:
- In areas of the Gogebic soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

- In areas of the Dishno soil, mounding or adding suitable fill material helps to raise the absorption field above the bedrock and the water table.

124D—Gogebic-Dishno cobbly silt loams, 6 to 18 percent slopes, rocky, very stony

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 5 to 300 acres

Typical Profile

Gogebic
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black cobbly silt loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 13 inches—dark reddish brown cobbly fine sandy loam
13 to 18 inches—reddish brown, firm cobbly sandy loam
18 to 62 inches—reddish brown, very firm very gravelly sandy loam and very gravelly loamy sand
Substratum:
62 to 80 inches—reddish brown very gravelly sandy loam

Dishno
Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Soil Properties and Qualities

Depth class: Gogebic—very deep; Dishno—deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Gogebic—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the middle and lower parts of the subsoil, and moderate in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum

Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Gogebic soil and similar soils: 50 to 70 percent
Dishno soil and similar soils: 20 to 35 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska and well drained Schweitzer soils in landscape positions similar to those of the major soils
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Soils in areas where the surface stones are 1 to 3 feet apart
- Soils that have bedrock at a depth of less than 40 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock, seasonal wetness, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and bedrock.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields

Major management concerns: Restricted permeability, depth to bedrock, seasonal wetness, slope

Management considerations:

- In areas of the Gogebic soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas of the Dishno soil, mounding or adding suitable fill material helps to raise the absorption field above the bedrock and water table.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

125D—Keweenaw-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 200 acres

Typical Profile

Keweenaw

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray cobbly loamy sand
Subsoil:
4 to 12 inches—reddish brown cobbly loamy sand
12 to 23 inches—light brown cobbly sand and yellowish red cobbly loamy sand
23 to 37 inches—brown loamy sand
37 to 80 inches—brown sand and dark brown loamy sand

Kalkaska

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low

Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 45 to 65 percent
Kalkaska soil and similar soils: 15 to 30 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming soils and the well drained Michigamme and Alcona soils in landscape positions similar to those of the major soils
- The poorly drained Witbeck and very poorly drained Tawas soils in depressions and drainageways

Similar components:
- Kalkaska soils that have a surface layer of sandy loam
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

125F—Keweenaw-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 15 to 300 acres

Typical Profile

Keweenaw
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—pinkish gray cobbly loamy sand
Subsoil:
4 to 12 inches—reddish brown cobbly loamy sand
12 to 23 inches—light brown cobbly sand and yellowish red cobbly loamy sand
23 to 37 inches—brown loamy sand
37 to 80 inches—brown sand and dark brown loamy sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keweenaw—moderately rapid; Kalkaska—rapid
Available water capacity: Low
Drainage class: Keweenaw—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low

Hazard of water erosion: Severe
Hazard of soil blowing: Keweenaw—moderate; Kalkaska—severe

Map Unit Composition

Keweenaw soil and similar soils: 45 to 65 percent
Kalkaska soil and similar soils: 15 to 30 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming soils and the well drained Peshekee and Schweitzer soils in landscape positions similar to those of the major soils
- The poorly drained Witbeck and very poorly drained Tawas soils in depressions and drainageways

Similar components:
- Kalkaska soils that have a surface layer of sandy loam
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

126B—Sundog silt loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 1,200 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chabeneau soils in the slightly lower positions on the landscape
- The poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, seasonal droughtiness, tilth, content of organic matter
Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Overgrazing, surface compaction
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

126D—Sundog silt loam, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces and outwash plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 250 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam

Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Water erosion, soil blowing, nutrient loss, seasonal droughtiness, tilth, content of organic matter

Management considerations:
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Conservation tillage, windbreaks, vegetative barriers, cover crops, stripcropping, and cropping systems that include close-growing crops help to control soil blowing.
- Increasing the content of organic matter in the root zone may increase the ability of the soil to hold water, nutrients, and pesticides and reduce the hazard of ground-water pollution.
- Leaving crop residue on the surface and adding other organic material conserve moisture.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Including green manure crops in the cropping sequence, using a system of no-till planting, and applying crop residue management techniques can increase the content of organic matter.

Pasture
Major management concerns: Overgrazing, surface compaction, erosion
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

126E—Sundog silt loam, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash terraces, eskers, and kames
Shape of areas: Irregular or elongated
Size of areas: 5 to 75 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam

Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

127B—Sundog silt loam, 1 to 6 percent slopes, bouldery

Setting

Landform: Gently undulating areas on outwash terraces and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 85 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chabeneau soils in areas that have slopes of less than 4 percent
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are 9 to 60 feet apart
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

127D—Sundog silt loam, 6 to 18 percent slopes, bouldery

Setting

Landform: Gently rolling and rolling areas on outwash terraces and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None

Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Vanriper soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are 9 to 60 feet apart
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

127F—Sundog silt loam, 18 to 45 percent slopes, bouldery

Setting

Landform: Very hilly areas on outwash terraces and disintegration moraines
Shape of areas: Irregular or elongated
Size of areas: 5 to 70 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Vanriper soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of gravelly loamy sand
- Soils in areas where the surface boulders are 9 to 60 feet apart
- Soils that contain more than 15 percent rock fragments in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition

Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

128B—Kalkaska-Waiska complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular
Size of areas: 15 to 200 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand

Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Waiska—very rapid
Available water capacity: Kalkaska—low; Waiska—very low
Drainage class: Kalkaska—somewhat excessively drained; Waiska—excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Kalkaska—severe; Waiska—moderate

Map Unit Composition

Kalkaska soil and similar soils: 40 to 65 percent
Waiska soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Yalmer soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Waiska soils that have a lower content of gravel and cobbles
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.

128D—Kalkaska-Waiska complex, 6 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on outwash terraces and outwash plains
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Waiska—very rapid
Available water capacity: Kalkaska—low; Waiska—very low
Drainage class: Kalkaska—somewhat excessively drained; Waiska—excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Kalkaska—severe; Waiska—moderate

Map Unit Composition

Kalkaska soil and similar soils: 40 to 65 percent
Waiska soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Yalmer soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Waiska soils that have a lower content of gravel and cobbles
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

128E—Kalkaska-Waiska complex, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on outwash terraces and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 70 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand

Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Waiska—very rapid
Available water capacity: Kalkaska—low; Waiska—very low
Drainage class: Kalkaska—somewhat excessively drained; Waiska—excessively drained
Surface runoff class: Kalkaska—slow; Waiska—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Kalkaska—severe; Waiska—moderate

Map Unit Composition

Kalkaska soil and similar soils: 40 to 65 percent
Waiska soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Tokiahok soils, which have a very firm layer in the lower part of the subsoil; in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Waiska soils that have a lower content of gravel and cobbles
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Because loose sand and the slope can hinder the traction of wheeled equipment, skid roads should be built on the contour or on the gentler slopes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

129C—Kalkaska-Munising complex, 1 to 12 percent slopes, dissected

Setting

Landform: Nearly level to moderately sloping, dissected areas on till-floored lake plains
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are 50 to 300 feet apart. The ravines are 5 to 15 feet deep and 15 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 10 to 125 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 18 inches—dark reddish brown and yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Munising—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum

Available water capacity: Low
Drainage class: Kalkaska—somewhat excessively drained; Munising—moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Kalkaska—severe; Munising—moderate

Map Unit Composition

Kalkaska soil and similar soils: 45 to 65 percent
Munising soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Skanee soils in areas that have slopes of less than 3 percent

Similar components:
- Kalkaska soils that have more gravel in the substratum
- Munising soils that are sand in the surface layer and the upper part of the subsoil
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- The seasonal high water table in areas of the Munising soil restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is adequate snow cover.
- In areas of the Kalkaska soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- In areas of the Munising soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Munising soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, restricted permeability
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- In areas of the Munising soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Land shaping or pressurizing the absorption field or installing alternating drain fields helps to overcome the slope and helps to compensate for the restricted permeability in areas of the Munising soil.

130A—Chabeneau silt loam, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on outwash terraces and outwash plains
Shape of areas: Elongated or irregular
Size of areas: 5 to 250 acres

Typical Profile

Organic mat:
0 to 1 inch—partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark grayish brown silt loam
Subsurface layer:
2 to 5 inches—reddish gray silt loam
Subsoil:
5 to 22 inches—dark reddish brown and brown silt loam
22 to 30 inches—brown gravelly loamy coarse sand
Substratum:
30 to 48 inches—brown, mottled, stratified very gravelly coarse sand and coarse sand
48 to 121 inches—brown, mottled, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Chabeneau soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Sundog soils in the slightly higher positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a sandy surface layer
- Soils that have stones and boulders on the surface

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Landing sites generally can be used only during the driest time of the year.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, poor filtering capacity
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of this soil can result in the pollution of ground water.

131—Witbeck-Cathro complex, very bouldery

Setting

Landform: Depressions and drainageways on bedrock-controlled moraines
Shape of areas: Elongated or oval
Size of areas: 5 to 125 acres

Typical Profile

Witbeck
Surface layer:
0 to 8 inches—black very stony muck
Subsoil:
8 to 12 inches—gray very stony fine sandy loam
12 to 15 inches—greenish gray, mottled very stony very fine sandy loam
15 to 22 inches—dark olive gray, mottled very stony fine sandy loam
22 to 24 inches—olive gray, mottled gravelly fine sandy loam

Substratum:
24 to 80 inches—dark gray, mottled gravelly sandy loam

Cathro
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 31 inches—black muck
Substratum:
31 to 80 inches—dark grayish brown fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Witbeck—moderate; Cathro—moderately slow to moderately rapid in the surface and subsurface tiers and moderately slow in the substratum
Available water capacity: Witbeck—moderate; Cathro—very high
Drainage class: Witbeck—poorly drained; Cathro—very poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Witbeck soil and similar soils: 45 to 60 percent
Cathro soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keewaydin soils on knolls and ridges
- The somewhat poorly drained Net soils in the slightly higher positions on the landscape

Similar components:
- Soils in areas where the surface boulders are 3 to 10 feet apart
- Witbeck soils that have a substratum of stratified sand and gravelly sand

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Boulders and stones on the surface can hinder harvesting operations and damage equipment.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of low strength, suitable surfacing material is needed on year-round logging roads and landings.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on these soils.

- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

132—Slickens

Setting

Landform: Mine tailings basins
Shape of areas: Oval or irregular
Size of areas: 5 to 1,700 acres

Map Unit Composition

This map unit consists of mine tailings from the iron ore pelletizing process. Slickens are accumulations of material separated in ore-mill operations. They consist of finely ground rock that has undergone chemical treatment during the milling process. The material is impounded in basins that are supported by containment dikes constructed from mine overburden.

About 70 percent of this map unit consists of areas of open water, where the concentration of tailings, in solution, is low. Included are small areas of semisolid, highly concentrated solutions, which are red or gray. These areas do not support vegetation.

About 15 percent of the map unit consists of containment dikes. These are stabilized areas that are vegetated on the side away from the basins. They are composed of cobble- and stone-sized broken rock, transported soil material, and solid mine spoil. Some areas are reinforced with concrete. The sides are steep or very steep. Access roads follow the crest.

About 10 percent of the map unit consists of solid mining waste, which has been moved around by heavy equipment. Most of this material is finely crushed, but areas of rock fragments are included. Some areas are beginning to support vegetation naturally, and other areas are being revegetated.

The remaining 5 percent of the map unit consists of small areas of rock outcrop that have been incorporated into the containment dikes, bermed roadways, and small narrow causeways that connect land masses.

Use and Management

Land use: Active tailings basins are generally covered with water. Inactive tailings basins are in various stages of revegetation. Older areas support grasses, brush, or small trees.
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

133B—Keewaydin-Dishno complex, 1 to 6 percent slopes, rocky, bouldery

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 20 to 45 acres

Typical Profile

Keewaydin
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Dishno
Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Soil Properties and Qualities

Depth class: Keewaydin—very deep; Dishno—deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum
Available water capacity: Keewaydin—moderate; Dishno—low
Drainage class: Keewaydin—well drained; Dishno—moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 45 to 60 percent
Dishno soil and similar soils: 20 to 40 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils in landscape positions similar to those of the major soils
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, depth to bedrock
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Dishno soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.

Septic tank absorption fields
Major management concerns: Seasonal wetness, depth to bedrock
Management considerations:
- In areas of the Dishno soil, filling or mounding with suitable material helps to raise the absorption field above the water table and the bedrock.

133D—Keewaydin-Dishno complex, 6 to 18 percent slopes, rocky, bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 700 acres

Typical Profile

Keewaydin

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Dishno

Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly fine sandy loam
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Soil Properties and Qualities

Depth class: Keewaydin—very deep; Dishno—deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum
Available water capacity: Keewaydin—moderate; Dishno—low
Drainage class: Keewaydin—well drained; Dishno—moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 45 to 60 percent
Dishno soil and similar soils: 20 to 40 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion soils in landscape positions similar to those of the major soils
- The poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock, seasonal wetness, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Dishno soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope, seasonal wetness, depth to bedrock
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- In areas of the Dishno soil, filling or mounding with suitable material helps to raise the absorption field above the water table.

134B—Keewaydin cobbly fine sandy loam, 1 to 6 percent slopes, bouldery

Setting

Landform: Gently undulating areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion and Dishno soils in landscape positions similar to those of the Keewaydin soil
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: None

134D—Keewaydin cobbly fine sandy loam, 6 to 18 percent slopes, bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 5 to 900 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion and Dishno soils in landscape positions similar to those of the Keewaydin soil
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

134F—Keewaydin cobbly fine sandy loam, 18 to 45 percent slopes, bouldery

Setting

Landform: Very hilly areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Keewaydin soil
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

135A—Witbeck-Net complex, 0 to 3 percent slopes, extremely bouldery

Setting

Landform: Depressions and drainageways on disintegration moraines and bedrock-controlled moraines
Shape of areas: Elongated or irregular
Size of areas: 5 to 125 acres

Typical Profile

Witbeck
Surface layer:
0 to 8 inches—black very stony muck
Subsoil:
8 to 12 inches—gray very stony fine sandy loam
12 to 15 inches—greenish gray, mottled very stony very fine sandy loam
15 to 22 inches—dark olive gray, mottled very stony fine sandy loam
22 to 24 inches—olive gray, mottled gravelly fine sandy loam
Substratum:
24 to 80 inches—dark gray, mottled gravelly sandy loam

Net
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—pinkish gray cobbly very fine sandy loam
Subsoil:
5 to 18 inches—dark brown and reddish brown, mottled cobbly very fine sandy loam
18 to 45 inches—brown, mottled, very firm gravelly fine sandy loam
Substratum:
45 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 3 to 10 feet apart
Permeability: Witbeck—moderate; Net—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Witbeck—moderate; Net—low
Drainage class: Witbeck—poorly drained; Net—somewhat poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: Witbeck—high; Net—medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Witbeck soil and similar soils: 45 to 70 percent
Net soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Champion and Dishno soils in the higher positions on the landscape
- The very poorly drained Cathro and Carbondale soils in depressions and drainageways
- Areas of rock outcrop

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are spaced 10 to 65 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Witbeck soil.
- Trees that can withstand seasonal wetness should be selected for planting on the Net soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Cutbanks caving, ponding, seasonal wetness
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Because of ponding, the Witbeck soil is generally unsuited to building site development.
- In areas of the Net soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Ponding, seasonal wetness, restricted permeability
Management considerations:
- Because of ponding, the Witbeck soil is generally unsuited to use as a site for septic tank absorption fields.
- Mounding or adding suitable fill material helps to raise the absorption field above the water table in areas of the Net soil.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Net soil.

136A—Minocqua-Channing complex, 0 to 3 percent slopes

Setting

Landform: Depressions and drainageways on outwash terraces and outwash plains
Shape of areas: Elongated or irregular
Size of areas: 5 to 200 acres

Typical Profile

Minocqua
Organic mat:
0 to 2 inches—dark brown, undecomposed sphagnum moss

Surface layer:
2 to 5 inches—black muck
Subsurface layer:
5 to 7 inches—very dark gray mucky fine sandy loam
Subsoil:
7 to 11 inches—dark grayish brown, mottled fine sandy loam
11 to 18 inches—grayish brown, mottled very fine sandy loam
18 to 23 inches—mottled, dark grayish brown fine sandy loam
Substratum:
23 to 80 inches—dark grayish brown gravelly coarse sand

Channing
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 5 inches—dark reddish brown fine sandy loam
Subsurface layer:
5 to 9 inches—reddish gray, mottled very fine sandy loam
Subsoil:
9 to 18 inches—brown, mottled very fine sandy loam
18 to 22 inches—brown, mottled fine sandy loam
22 to 28 inches—strong brown, mottled gravelly sand
Substratum:
28 to 80 inches—brown gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Minocqua—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum; Channing—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Minocqua—poorly drained; Channing—somewhat poorly drained
Surface runoff class: Minocqua—very slow or ponded; Channing—very slow
Flooding: None
Content of organic matter: Minocqua—high; Channing—low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Minocqua soil and similar soils: 45 to 70 percent
Channing soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Pence and moderately well drained Chabeneau soils in the higher positions on the landscape
- The poorly drained Kinross soils in landscape positions similar to those of the major soils

Similar components:
- Soils that have a loamy substratum

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Minocqua soil.
- Trees that can withstand seasonal wetness should be selected for planting on the Channing soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development

Major management concerns: Cutbanks caving, ponding, seasonal wetness

Management considerations:

- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Because of ponding, the Minocqua soil is generally unsuited to building site development.
- In areas of the Channing soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields

Major management concerns: Ponding, seasonal wetness, poor filtering capacity

Management considerations:

- Because of ponding, the Minocqua soil is generally unsuited to use as a site for septic tank absorption fields.
- Mounding or adding suitable fill material helps to raise the absorption field above the water table in areas of the Channing soil.
- The poor filtering capacity of these soils can result in the pollution of ground water.

137D—Keewaydin-Sundog complex, 6 to 18 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 10 to 1,300 acres

Typical Profile

Keewaydin

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam

Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 40 to 60 percent
Sundog soil and similar soils: 30 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chabeneau soils in the slightly lower positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a surface layer of sandy loam
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Slope, poor filtering capacity
Management considerations:
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.

137F—Keewaydin-Sundog complex, 18 to 45 percent slopes, very bouldery

Setting

Landform: Very hilly areas on disintegration moraines
Shape of areas: Irregular
Size of areas: 25 to 200 acres

Typical Profile

Keewaydin
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam

Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Sundog—moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 40 to 60 percent
Sundog soil and similar soils: 30 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chabeneau soils in the lower positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a surface layer of sandy loam
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

138D—Sundog-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops (fig. 14)
Shape of areas: Irregular
Size of areas: 10 to 800 acres

Typical Profile

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Sundog
Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 45 to 75 percent
Rock outcrop: 10 to 40 percent
Dissimilar components: 5 to 15 percent

Figure 14.—Rock outcrop in an area of Sundog-Rock outcrop complex, 6 to 25 percent slopes, very bouldery. Rock outcrop is common in the survey area.

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of very cobbly loamy sand
- Soils that are sandy loam in the surface layer and subsoil
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.

- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of the Sundog soil can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

138F—Sundog-Rock outcrop complex, 25 to 70 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Sundog
Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam

Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Sundog
Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 45 to 75 percent
Rock outcrop: 10 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of very cobbly loamy sand
- Soils that are sandy loam in the surface layer and subsoil
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

139B—Sundog silt loam, 1 to 6 percent slopes, rocky, very bouldery

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam
Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Rock outcrop: 1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of very cobbly loamy sand
- Soils that are sandy loam in the surface layer and subsoil
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

139D—Sundog silt loam, 6 to 18 percent slopes, rocky, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 15 to 80 acres

Typical Profile

Surface layer:
0 to 1 inch—very dark grayish brown silt loam
Subsurface layer:
1 to 2 inches—brown silt loam

Subsoil:
2 to 17 inches—brown and strong brown silt loam
17 to 22 inches—brown fine sandy loam
Substratum:
22 to 38 inches—dark yellowish brown gravelly sand
38 to 80 inches—yellowish brown, stratified sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Moderate in the surface layer, subsurface layer, and subsoil and very rapid in the substratum
Available water capacity: Moderate
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sundog soil and similar soils: 85 to 95 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Sundog soil
- The somewhat poorly drained Channing soils and the poorly drained Minocqua and Witbeck soils in depressions and drainageways

Similar components:
- Soils that have a substratum of very cobbly loamy sand
- Soils that are sandy loam in the surface layer and subsoil
- Soils that are sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope

Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

140B—Champion-Dishno complex, 1 to 6 percent slopes, rocky, very stony

Setting

Landform: Gently undulating areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 15 acres

Typical Profile

Champion
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—very dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 26 inches—dark reddish brown and reddish brown cobbly fine sandy loam
26 to 36 inches—reddish brown, mottled, very firm gravelly sandy loam
36 to 43 inches—brown, mottled, very firm gravelly loamy sand
Substratum:
43 to 80 inches—brown gravelly loamy sand

Dishno
Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Soil Properties and Qualities

Depth class: Champion—very deep; Dishno—deep
Rock fragments on the surface: Stones spaced approximately 3 to 26 feet apart

Permeability: Champion—moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Champion soil and similar soils: 50 to 75 percent
Dishno soil and similar soils: 20 to 35 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keewaydin soils in the higher landscape positions
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of 20 to 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, depth to bedrock
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and bedrock.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, depth to bedrock

Management considerations:
- Mounding or adding suitable fill material helps to raise the absorption field above the water table and bedrock.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

140D—Champion-Dishno complex, 6 to 18 percent slopes, rocky, very stony

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 175 acres

Typical Profile

Champion
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—very dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 26 inches—dark reddish brown and reddish brown cobbly fine sandy loam
26 to 36 inches—reddish brown, mottled, very firm gravelly sandy loam
36 to 43 inches—brown, mottled, very firm gravelly loamy sand
Substratum:
43 to 80 inches—brown gravelly loamy sand

Dishno
Organic mat:
0 to 1 inch—reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—unweathered gneiss

Soil Properties and Qualities

Depth class: Champion—very deep; Dishno—deep
Rock fragments on the surface: Stones spaced approximately 3 to 26 feet apart
Permeability: Champion—moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained

Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Champion soil and similar soils: 50 to 75 percent
Dishno soil and similar soils: 20 to 35 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keewaydin soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Net and poorly drained Witbeck soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of 20 to 40 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, slope
Management considerations:
- Mounding or adding suitable fill material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

141D—Pelissier-Rock outcrop complex, 6 to 25 percent slopes

Setting

Landform: Gently rolling and rolling outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 20 to 50 acres

Typical Profile

Pelissier
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 36 inches—strong brown very gravelly coarse sand
36 to 80 inches—reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Pelissier
Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 45 to 75 percent
Rock outcrop: 10 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Pelissier soil
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways
- Soils that have slopes of 25 to 60 percent

Similar components:
- Soils that have a lower content of gravel and cobbles in the subsoil and substratum
- Soils in areas where the surface boulders are 60 to 120 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of the Pelissier soil can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

142B—Pelissier gravelly sandy loam, 1 to 6 percent slopes, rocky

Setting

Landform: Gently undulating outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops

Shape of areas: Irregular
Size of areas: 5 to 125 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 36 inches—strong brown very gravelly coarse sand
36 to 80 inches—reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 80 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Farquar soils in the slightly lower positions on the landscape
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a lower content of gravel and cobbles in the subsoil and substratum
- Soils in areas where the surface boulders are 60 to 120 feet apart or where stones are 10 to 75 feet apart

Use and Management

Woodland
Major management concerns: Seedling mortality, erosion hazard
Management considerations:
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving

Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

142D—Pelissier gravelly sandy loam, 6 to 18 percent slopes, rocky

Setting

Landform: Gently rolling and rolling outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 12 to 45 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 10 inches—dark reddish brown gravelly sandy loam
10 to 21 inches—yellowish red very gravelly loamy coarse sand
Substratum:
21 to 36 inches—strong brown very gravelly coarse sand
36 to 80 inches—reddish yellow very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pelissier soil and similar soils: 80 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Farquar soils in the slightly lower positions on the landscape
- The poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a lower content of gravel and cobbles in the subsoil and substratum
- Soils in areas where the surface boulders are 60 to 120 feet apart or where stones are 10 to 75 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

144B—Farquar gravelly sandy loam, 0 to 4 percent slopes

Setting

Landform: Nearly level and gently undulating areas on outwash terraces and outwash plains
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—black gravelly sandy loam
Subsurface layer:
4 to 6 inches—brown gravelly sandy loam
Subsoil:
6 to 9 inches—dark reddish brown very gravelly loamy sand
9 to 20 inches—reddish brown very gravelly coarse sand
20 to 36 inches—strong brown, mottled very gravelly coarse sand
Substratum:
36 to 80 inches—light brown, mottled, stratified very gravelly coarse sand and sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately rapid in the surface layer and subsurface layer and very rapid in the subsoil and substratum
Available water capacity: Very low
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Farquar soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Pelissier soils in the slightly higher positions on the landscape
- The poorly drained Deford and Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a lower content of gravel and cobbles in the subsoil and substratum
- Soils that are sand in the surface layer and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

145C—Munising-Yalmer complex, 1 to 12 percent slopes, dissected, very stony

Setting

Landform: Nearly level to moderately sloping dissected areas on till-floored lake plains
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are

50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.

Shape of areas: Irregular or elongated

Size of areas: 10 to 300 acres

Typical Profile

Munising

Organic mat:

0 to 2 inches—black, partially decomposed forest litter

Surface layer:

2 to 6 inches—reddish gray fine sandy loam

Subsoil:

6 to 15 inches—dark reddish brown fine sandy loam

15 to 18 inches—yellowish red fine sandy loam

18 to 50 inches—reddish brown, mottled, very firm loamy fine sand and fine sandy loam

50 to 59 inches—reddish brown sandy loam

Substratum:

59 to 80 inches—reddish brown sandy loam

Yalmer

Organic mat:

0 to 1 inch—black, partially decomposed forest litter

Surface layer:

1 to 10 inches—reddish gray fine sand

Subsoil:

10 to 30 inches—dark reddish brown and reddish brown fine sand

30 to 80 inches—dark reddish gray, mottled, very firm loamy fine sand and reddish brown fine sandy loam

Soil Properties and Qualities

Depth class: Very deep

Rock fragments on the surface: Stones spaced approximately 3 to 26 feet apart

Permeability: Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum; Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil

Available water capacity: Low

Drainage class: Moderately well drained

Surface runoff class: Slow

Flooding: None

Content of organic matter: Low

Hazard of water erosion: Off-road—slight; on roads and trails—moderate

Hazard of soil blowing: Munising—moderate; Yalmer—severe

Map Unit Composition

Munising soil and similar soils: 50 to 65 percent

Yalmer soil and similar soils: 20 to 40 percent

Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:

- The somewhat excessively drained Kalkaska and well drained Onota soils in landscape positions similar to those of the major soils

• The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
• Soils that are gravelly in the surface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
• Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
• Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
• Large stones on the surface can hinder harvesting operations and damage equipment.
• Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
• Special management, such as creating areas of bare soil or limiting the size of openings, may be necessary to prepare the site in advance and to control undesirable species.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
• Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
• Wetness can be reduced by installing a drainage system around structures with basements and crawl spaces.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
• Filling or mounding with suitable material helps to raise the absorption field above the water table.
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

146B—Munising-Skanee complex, 0 to 6 percent slopes, stony

Setting

Landform: Munising—gently undulating areas on knolls and low ridges on till-floored lake plains and ground moraines; Skanee—nearly level areas in depressions and drainageways on till-floored lake plains and ground moraines
Shape of areas: Irregular or elongated
Size of areas: 10 to 500 acres

Typical Profile

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 15 inches—dark reddish brown fine sandy loam
15 to 18 inches—yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm loamy fine sand and fine sandy loam
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Skanee
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—very dark gray cobbly fine sandy loam
Subsurface layer;
4 to 7 inches—grayish brown cobbly fine sandy loam
Subsoil:
7 to 12 inches—brown sandy loam
12 to 14 inches—reddish brown, mottled, very firm loamy sand and sandy loam
14 to 30 inches—reddish brown, mottled, very firm sandy clay loam and fine sandy loam
Substratum:
30 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Skanee—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Low
Drainage class: Munising—moderately well drained; Skanee—somewhat poorly drained
Surface runoff class: Munising—slow; Skanee—very slow
Flooding: None
Content of organic matter: Munising—low; Skanee—medium
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Munising soil and slight in areas of the Skanee soil
Hazard of soil blowing: Moderate

Map Unit Composition

Munising soil and similar soils: 45 to 70 percent
Skanee soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Gay and Deford soils in depressions and drainageways

Similar components:
- Munising soils that are gravelly in the surface layer and subsoil
- Soils that are sand in the surface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- In areas of the Munising soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- The seasonal high water table restricts the use of equipment to midsummer, when the soils are dry, or midwinter, when there is an adequate snow cover.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

147A—Skanee-Gay complex, 0 to 3 percent slopes, very stony

Setting

Landform: Skanee—nearly level areas on upland plains; Gay—depressions and drainageways on till-floored lake plains and ground moraines
Shape of areas: Elongated or irregular
Size of areas: 15 to 1,000 acres

Typical Profile

Skanee
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—very dark gray cobbly fine sandy loam
Subsurface layer;
4 to 7 inches—grayish brown cobbly fine sandy loam
Subsoil:
7 to 12 inches—brown sandy loam
12 to 14 inches—reddish brown, mottled, very firm loamy sand and sandy loam
14 to 30 inches—reddish brown, mottled, very firm sandy clay loam and fine sandy loam
Substratum:
30 to 80 inches—reddish brown sandy loam

Gay
Surface layer:
0 to 2 inches—black muck
Subsurface layer:
2 to 5 inches—very dark gray brown fine sandy loam
Subsoil:
5 to 18 inches—brown, mottled loamy sand
18 to 31 inches—reddish brown, mottled sandy loam
Substratum:
31 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 26 feet apart
Permeability: Skanee—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Gay—moderate
Available water capacity: Skanee—low; Gay—moderate
Drainage class: Skanee—somewhat poorly drained; Gay—poorly drained
Surface runoff class: Skanee—very slow; Gay—very slow or ponded
Flooding: None
Content of organic matter: Skanee—medium; Gay—high
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Skanee soil and similar soils: 45 to 65 percent
Gay soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Munising and Yalmer soils in the higher positions on the landscape
- The very poorly drained Cathro soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravelly sand

- Soils that have sandstone bedrock at a depth of 20 to 60 inches
- Soils that are sand in the surface layer and subsoil

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Trees that can withstand seasonal wetness should be selected for planting on the Skanee soil.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Gay soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness, ponding

Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Skanee soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because of ponding, the Gay soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Seasonal wetness, restricted permeability, ponding

Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table in areas of the Skanee soil.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Skanee soil.
- Because of ponding, the Gay soil is generally unsuited to use as a site for septic tank absorption fields.

148B—Shoepac-Ensley complex, 0 to 6 percent slopes

Setting

Landform: Shoepac—undulating areas on knolls and low ridges on fluted ground moraines; Ensley—nearly level areas in depressions and drainageways on fluted ground moraines

Shape of areas: Elongated or irregular

Size of areas: 10 to 1,000 acres

Typical Profile

Shoepac
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish brown silt loam
Subsoil:
6 to 12 inches—brown fine sandy loam
12 to 23 inches—strong brown loamy sand
23 to 33 inches—reddish brown, mottled, firm loamy sand and fine sandy loam
33 to 53 inches—reddish brown, firm fine sandy loam
Substratum:
53 to 80 inches—reddish brown gravelly fine sandy loam

Ensley
Surface layer:
0 to 5 inches—black muck
5 to 7 inches—black mucky loam
Subsoil:
7 to 19 inches—brown, mottled fine sandy loam
Substratum:
19 to 80 inches—brown gravelly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Shoepac—moderate in the surface layer and subsoil and moderately slow in the substratum; Ensley—moderate
Available water capacity: Moderate
Drainage class: Shoepac—moderately well drained; Ensley—poorly drained
Surface runoff class: Shoepac—slow; Ensley—very slow or ponded
Flooding: None
Content of organic matter: Shoepac—low; Ensley—medium
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Shoepac soil and slight in areas of the Ensley soil
Hazard of soil blowing: Moderate

Map Unit Composition

Shoepac soil and similar soils: 65 to 75 percent
Ensley soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The well drained Trenary soils in the slightly higher positions on the landscape
- The somewhat poorly drained Charlevoix soils in positions between those of the Shoepac and Ensley soils
- The very poorly drained Cathro soils in positions similar to those of the Ensley soil

Similar components:
- Soils that have bedrock at a depth of 40 to 80 inches
- Shoepac soils that are sand or loamy sand in the surface layer and the upper part of the subsoil
- Shoepac soils that have a very firm subsoil and are very slowly permeable
- Ensley soils that have a sandy subsoil or substratum

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- In areas of the Shoepac soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can be used only when the soils are relatively dry or during periods in winter when the snow cover is adequate.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Ensley soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted on the Shoepac soil, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness, ponding

Management considerations:

- Because cutbanks in areas of the Shoepac soil are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Shoepac soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because of ponding, the Ensley soil is generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Seasonal wetness, ponding

Management considerations:

- Filling or mounding with suitable material helps to raise the absorption field above the water table in areas of the Shoepac soil.
- Because of ponding, the Ensley soil is generally unsuited to use as a site for septic tank absorption fields.

149—Evart-Cathro complex

Setting

Landform: Nearly level areas on flood plains
Shape of areas: Elongated
Size of areas: 10 to 200 acres

Typical Profile

Evart

Surface layer:
0 to 10 inches—very dark brown, mottled silt loam
Subsurface layer:
10 to 18 inches—black, mottled loamy fine sand

Substratum:
18 to 80 inches—grayish brown sand with few thin bands of very dark brown organic material

Cathro
Surface tier:
0 to 6 inches—black muck
Subsurface tier:
6 to 31 inches—black muck
Substratum:
31 to 80 inches—dark grayish brown fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Evart—rapid; Cathro—moderately slow to moderately rapid in the surface and subsurface tiers and moderately slow in the substratum
Available water capacity: Evart—low; Cathro—very high
Drainage class: Evart—poorly drained; Cathro—very poorly drained
Surface runoff class: Very slow or ponded
Frequency of flooding: Frequent
Content of organic matter: Evart—moderate; Cathro—high
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Evart soil and similar soils: 40 to 60 percent
Cathro soil and similar soils: 35 to 55 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Pelkie soils on knolls and low ridges
- The somewhat poorly drained Sturgeon soils in the slightly higher positions on the landscape

Similar components:
- Cathro soils in which the muck is more than 51 inches thick

Use and Management

Land use: Dominant use—woodland; other use—wildlife habitat

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of flooding, wetness, and ponding, these soils are generally unsuited to woodland harvesting.

Building site development
Major management concerns: Flooding, ponding, excess humus
Management considerations:
- Because of flooding, ponding, and excess humus, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Flooding, ponding

Management considerations:
- Because of flooding and ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

150—Shag muck

Setting

Landform: Depressions and drainageways on lake plains
Shape of areas: Elongated or irregular
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 2 inches—black muck
2 to 5 inches—black silt loam
Subsurface layer:
5 to 11 inches—very dark gray, mottled silt loam
Subsoil:
11 to 25 inches—brown, mottled silt loam
Substratum:
25 to 80 inches—brown, mottled silt loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Slow
Available water capacity: High
Drainage class: Poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: Medium
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Shag soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Fence and somewhat poorly drained Spear soils in the higher positions on the landscape
- The very poorly drained Cathro soils in landscape positions similar to those of the Shag soil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.

- Because of wetness and low strength, equipment can be used only during periods in winter when the snow cover is adequate or when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, windthrow hazard, and plant competition, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding
Management considerations:
- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

151A—Spear very fine sandy loam, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on lake plains
Shape of areas: Elongated
Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 2 inches—dark brown very fine sandy loam
Subsurface layer:
2 to 6 inches—yellowish brown, mottled very fine sandy loam
Subsoil:
6 to 31 inches—mottled, reddish brown silt loam and yellowish brown very fine sandy loam
Substratum:
31 to 80 inches—stratified, mottled, brown silt loam, silty clay loam, loamy very fine sand, and very fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately slow
Available water capacity: High
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Moderate
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Spear soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Fence soils in the slightly higher positions on the landscape
- The poorly drained Shag soils in depressions and drainageways

Similar components:
- Soils that are fine sandy loam in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed. Trees that can withstand seasonal wetness should be selected for planting.

Building site development
Major management concerns: Seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

153D—Ishpeming-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines, outwash terraces, and outwash plains
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Ishpeming
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown sand
Subsoil:
6 to 24 inches—dark brown, brown, and strong brown sand

Substratum:
24 to 38 inches—brown loamy fine sand
Bedrock:
38 inches—granite

Soil Properties and Qualities

Ishpeming
Depth class: Moderately deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Rapid
Available water capacity: Very low
Drainage class: Somewhat excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Severe

Map Unit Composition

Ishpeming soil and similar soils: 35 to 60 percent
Rock outcrop: 25 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils and the well drained Rousseau and Michigamme soils in landscape positions similar to those of the Ishpeming soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Special care is needed in laying out logging roads and operating logging equipment in the steeper areas. The grade should be kept as low as possible.
- Rock outcrops and the depth to bedrock should be considered when locations for roads and landing sites are planned.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Depth to bedrock, cutbanks caving, slope

Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Depth to bedrock, poor filtering capacity, slope
Management considerations:
- The Ishpeming soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock, the poor filtering capacity, and the slope. Inadequately treated sewage effluent flowing through crevices in the bedrock and the poor filtering capacity of this soil can result in the pollution of ground water.

153F—Ishpeming-Rock outcrop complex, 25 to 70 percent slopes, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines, outwash terraces, and outwash plains
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Ishpeming
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown sand
Subsoil:
6 to 24 inches—dark brown, brown, and strong brown sand
Substratum:
24 to 38 inches—brown loamy fine sand
Bedrock:
38 inches—granite

Soil Properties and Qualities

Ishpeming
Depth class: Moderately deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Rapid
Available water capacity: Very low
Drainage class: Somewhat excessively drained
Surface runoff class: Medium

Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Severe

Map Unit Composition

Ishpeming soil and similar soils: 35 to 60 percent
Rock outcrop: 25 to 50 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils and the well drained Rousseau and Michigamme soils in landscape positions similar to those of the Ishpeming soil
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Rock outcrops and the depth to bedrock should be considered when locations for roads and landing sites are planned.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

154B—Rubicon-Sayner complex, 1 to 6 percent slopes, rocky

Setting

Landform: Gently undulating outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 150 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—stratified, light yellowish brown sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Rubicon—low; Sayner—very low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Rubicon—severe; Sayner—moderate

Map Unit Composition

Rubicon soil and similar soils: 30 to 60 percent
Sayner soil and similar soils: 25 to 55 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming and excessively drained Pelissier soils in landscape positions similar to those of the major soils
- The moderately well drained Croswell soils in areas that have slopes of less than 3 percent

Similar components:
- Soils that have a surface layer of sandy loam

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality
Management considerations:
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.

154D—Rubicon-Sayner complex, 6 to 18 percent slopes, rocky

Setting

Landform: Gently rolling and rolling outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 40 acres

Typical Profile

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Sayner
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 2 inches—dark reddish gray loamy sand
Subsoil:
2 to 14 inches—dark reddish brown and strong brown loamy sand
14 to 27 inches—strong brown sand
Substratum:
27 to 80 inches—stratified, light yellowish brown sand and gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Rubicon—low; Sayner—very low
Drainage class: Excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Rubicon—severe; Sayner—moderate

Map Unit Composition

Rubicon soil and similar soils: 30 to 60 percent
Sayner soil and similar soils: 25 to 55 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Ishpeming and excessively drained Pelissier soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Soils that have a surface layer of sandy loam

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because loose sand can hinder the traction of wheeled equipment, logging roads should be stabilized.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

155A—Zeba-Jacobsville complex, 0 to 3 percent slopes, very stony

Setting

Landform: Zeba—nearly level areas on low knolls on sandstone benches; Jacobsville—nearly level areas in depressions and drainageways on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 10 to 1,000 acres

Typical Profile

Zeba
Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 10 inches—reddish gray cobbly fine sandy loam
Subsoil:
10 to 14 inches—reddish brown, mottled cobbly fine sandy loam
14 to 31 inches—mottled, brown loamy sand and reddish brown sandy loam
Bedrock:
31 inches—very dusky red sandstone

Jacobsville
Surface layer:
0 to 4 inches—black muck
Subsurface layer:
4 to 9 inches—dark gray, mottled loam
Subsoil:
9 to 16 inches—reddish brown, mottled sandy loam
Substratum:
16 to 28 inches—reddish brown, mottled sandy loam
Bedrock:
28 inches—reddish brown sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Zeba—somewhat poorly drained; Jacobsville—poorly drained
Surface runoff class: Zeba—very slow; Jacobsville—very slow or ponded
Flooding: None
Content of organic matter: Zeba—moderate; Jacobsville—high
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Zeba soil and similar soils: 50 to 70 percent
Jacobsville soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chocolay, Munising, and Sauxhead soils in the slightly higher positions on the landscape
- The very poorly drained Skandia soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Soils that have a higher content of rock fragments throughout
- Soils that are sand to very gravelly sand throughout
- Soils in areas where the surface stones are 1 to 3 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Landing sites generally can be used only during the driest time of the year.
- Trees that can withstand seasonal wetness should be selected for planting on the Zeba soil.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Jacobsville soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Depth to bedrock, cutbanks caving, seasonal wetness, ponding
Management considerations:
- In areas of the Zeba soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Because of ponding, the Jacobsville soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness, ponding
Management considerations:
- Because of the depth to bedrock, seasonal wetness, and ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

156B—Duel loamy sand, 1 to 6 percent slopes, very stony

Setting

Landform: Gently undulating areas on bedrock benches
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Subsoil:
1 to 22 inches—dark reddish brown loamy sand
Substratum:
22 to 32 inches—dark brown and pale brown, soft and weathered dolomitic sandstone
Bedrock:
32 inches—pale brown dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Rapid
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Duel soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Reade soils in the slightly lower positions on the landscape
- The somewhat poorly drained Sundell and poorly drained Nahma soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches
- Soils that are sandy loam in the upper 10 inches of the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard
Management considerations:
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

Building site development

Major management concerns: Cutbanks caving, depth to bedrock

Management considerations:

- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields

Major management concerns: Depth to bedrock, poor filtering capacity

Management considerations:

- This soil is generally unsuited to use as a site for septic tank absorption fields because of the poor filtering capacity and the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

157B—Reade-Nahma complex, 0 to 6 percent slopes, stony

Setting

Landform: Reade—gently undulating areas on ground moraines; Nahma—nearly level areas in depressions and drainageways on ground moraines

Shape of areas: Irregular

Size of areas: 15 to 800 acres

Typical Profile

Reade

Organic mat:

0 to 4 inches—black, well decomposed forest litter

Surface layer:

4 to 7 inches—brown silt loam

Subsoil:

7 to 12 inches—dark brown loam and fine sandy loam

12 to 15 inches—firm, brown fine sandy loam

15 to 20 inches—reddish brown, mottled gravelly fine sandy loam and loamy fine sand

20 to 28 inches—reddish brown, mottled gravelly fine sandy loam

Bedrock:

28 inches—pale brown dolomitic sandstone

Nahma

Surface layer:

0 to 11 inches—black muck

Subsurface layer:

11 to 14 inches—very dark grayish brown mucky loam

Subsoil:

14 to 17 inches—dark gray, mottled loam

17 to 19 inches—brown, mottled loam

Substratum:

19 to 24 inches—brown, mottled gravelly fine sandy loam

Bedrock:

24 inches—dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Reade—moderately well drained; Nahma—poorly drained
Surface runoff class: Reade—slow; Nahma—very slow or ponded
Flooding: None
Content of organic matter: Reade—low; Nahma—high
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Reade soil and slight in areas of the Nahma soil
Hazard of soil blowing: Moderate

Map Unit Composition

Reade soil and similar soils: 30 to 60 percent
Nahma soil and similar soils: 25 to 55 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Trenary soils in the higher positions on the landscape
- The moderately well drained Shoepac soils in landscape positions similar to those of the Reade soil
- The somewhat poorly drained Sundell soils in landscape positions slightly lower than those of the Reade soil

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- In areas of the Reade soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- The seasonal high water table restricts the use of equipment to midsummer, when the soils are dry, or midwinter, when there is an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Nahma soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted on the Reade soil, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, seasonal wetness, ponding
Management considerations:
- Because of the depth to bedrock, seasonal wetness, and ponding, the Nahma soil is generally unsuited to building site development.

• In areas of the Reade soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness, ponding
Management considerations:
• Because of the depth to bedrock, seasonal wetness, and ponding, these soils are generally unsuited to use as sites for septic tank absorption fields.

158C—Munising-Onota-Yalmer complex, 1 to 12 percent slopes, dissected, stony

Setting

Landform: Nearly level to moderately sloping, dissected sandstone benches
Distinctive landscape features: Dissected uplands with mainly parallel ravines that are 50 to 300 feet apart. The ravines are 5 to 15 feet deep and 10 to 50 feet wide and have moderately sloping side slopes. The ravine bottoms are 10 to 20 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 400 acres

Typical Profile

Munising
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray fine sandy loam
Subsoil:
6 to 18 inches—dark reddish brown and yellowish red fine sandy loam
18 to 50 inches—reddish brown, mottled, very firm fine sandy loam and loamy fine sand
50 to 59 inches—reddish brown sandy loam
Substratum:
59 to 80 inches—reddish brown sandy loam

Onota
Organic mat:
0 to 1 inch—undecomposed hardwood forest litter
Surface layer:
1 to 2 inches—black gravelly sandy loam
Subsurface layer:
2 to 7 inches—reddish gray gravelly sandy loam
Subsoil:
7 to 10 inches—dark reddish brown gravelly sandy loam
10 to 22 inches—dark reddish brown, firm gravelly sandy loam
Bedrock:
22 inches—dark reddish brown sandstone

Yalmer
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand

Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—dark reddish gray, very firm loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—reddish brown and dark reddish gray, very firm fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Munising and Yalmer—very deep; Onota—moderately deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Munising—moderate in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum; Onota—moderate; Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the substratum
Available water capacity: Low
Drainage class: Munising and Yalmer—moderately well drained; Onota—well drained
Surface runoff class: Munising and Onota—slow; Yalmer—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Munising and Onota—moderate; Yalmer—severe

Map Unit Composition

Munising soil and similar soils: 30 to 60 percent
Onota soil and similar soils: 20 to 40 percent
Yalmer soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Zeba soils in areas that have slopes of less than 3 percent
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines

Similar components:
- Soils in areas where the surface stones are 3 to 25 feet apart
- Onota soils that have a seasonal high water table at a depth of 2.0 to 3.5 feet from October through May
- Munising and Yalmer soils that have bedrock at a depth of 40 to 60 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- The seasonal high water table in areas of the Munising and Yalmer soils restricts the use of equipment to midsummer, when the soils are dry, or midwinter, when there is adequate snow cover.

- In areas of the Munising soil, skidders should not be used during wet periods, when ruts form easily.
- In areas of the Yalmer soil, planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, depth to bedrock
Management considerations:
- In areas of the Munising and Yalmer soils, cutbanks are unstable and are subject to caving. Trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table or bedrock.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, depth to bedrock
Management considerations:
- In areas of the Munising and Yalmer soils, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Munising and Yalmer soils.
- The Onota soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

159A—Jeske sand, 0 to 3 percent slopes

Setting

Landform: Nearly level areas on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 15 to 80 acres

Typical Profile

Organic mat:
0 to 1 inch—very dark gray, partially decomposed forest litter
1 to 3 inches—black, well decomposed forest litter
Surface layer:
3 to 11 inches—light brownish gray sand
Substratum:
11 to 21 inches—very pale brown sand
21 to 31 inches—dark reddish brown, very firm, weathered sandstone

Bedrock:
31 inches—light gray and strong brown sandstone

Soil Properties and Qualities

Depth class: Shallow
Permeability: Rapid
Available water capacity: Low
Drainage class: Somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Moderate
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Jeske soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Carlshend soils in the slightly higher positions on the landscape
- The poorly drained Burt soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, cutbanks caving, seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock and the water table.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness, poor filtering capacity
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock, seasonal wetness, and the poor filtering capacity. Inadequately treated sewage effluent flowing through crevices in the bedrock can

pollute nearby ground-water supplies. Filling and mounding with a suitable filtering material helps to overcome these limitations.

160B—Paquin-Finch sands, 0 to 5 percent slopes

Setting

Landform: Paquin—gently undulating areas on low knolls on outwash plains, till-floored lake plains, and ground moraines; Finch—nearly level areas in depressions and drainageways on outwash plains, till-floored lake plains, and ground moraines
Shape of areas: Irregular or elongated
Size of areas: 50 to 250 acres

Typical Profile

Paquin
Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 11 inches—reddish gray sand
Subsoil:
11 to 12 inches—dark reddish brown sand
12 to 14 inches—dark reddish brown, strongly cemented sand
14 to 27 inches—brown sand
27 to 36 inches—strong brown, mottled sand
Substratum:
36 to 80 inches—brown sand

Finch
Organic mat:
0 to 3 inches—black, well decomposed forest litter
Surface layer:
3 to 10 inches—brown, mottled sand
Subsoil:
10 to 20 inches—dark brown and reddish gray, mottled, strongly cemented sand
20 to 29 inches—brown, mottled sand
Substratum:
29 to 80 inches—brown, mottled sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid in the surface layer, moderate or moderately rapid in the upper part of the subsoil, and rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Paquin—moderately well drained; Finch—somewhat poorly drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Paquin soil and similar soils: 45 to 55 percent
Finch soil and similar soils: 30 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Garlic soils on knolls and ridges
- The poorly drained Deford soils in depressions and drainageways

Similar components:
- Finch soils that are fine sand throughout
- Soils that have a loamy substratum

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because loose sand can interfere with the traction of wheeled equipment, logging roads should be stabilized.
- Trees that can withstand seasonal wetness should be selected for planting.
- In areas of the Finch soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, poor filtering capacity
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- The poor filtering capacity of these soils can result in the pollution of ground water.

161B—Yellowdog very channery sand, 0 to 6 percent slopes, stony

Setting

Landform: Nearly level and undulating areas on sandstone benches
Shape of areas: Irregular
Size of areas: 5 to 500 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter

Subsoil:
2 to 32 inches—reddish brown very channery sand
Bedrock:
32 inches—dusky red sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Yellowdog soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Sauxhead and somewhat poorly drained Zeba soils in the lower positions on the landscape
- The poorly drained Burt soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches

Use and Management

Woodland
Major management concerns: Seedling mortality, windthrow hazard
Management considerations:
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development
Major management concerns: Cutbanks caving, depth to bedrock
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, depth to bedrock
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock and the poor filtering capacity. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-

water supplies. Mounding with a suitable filtering material helps to overcome these limitations.

162B—Buckroe very channery loamy sand, 0 to 6 percent slopes, stony

Setting

Landform: Nearly level and undulating areas on sandstone benches
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Subsoil:
2 to 4 inches—reddish brown very channery loamy sand
4 to 15 inches—reddish brown very channery sand
Bedrock:
15 inches—dusky red sandstone

Soil Properties and Qualities

Depth class: Shallow
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Buckroe soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Sauxhead soils in the slightly lower positions on the landscape
- The poorly drained Burt soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of 20 to 60 inches

Use and Management

Woodland
Major management concerns: Seedling mortality, windthrow hazard
Management considerations:
- Because of the depth to bedrock, planting is not practical in areas of this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development
Major management concerns: Depth to bedrock
Management considerations:
- Excavation is hampered by the limited depth to bedrock.

Septic tank absorption fields
Major management concerns: Depth to bedrock, poor filtering capacity
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock and the poor filtering capacity. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome these limitations.

165B—Chocolay-Waiska complex, 1 to 6 percent slopes, stony

Setting

Landform: Gently undulating areas on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 10 to 200 acres

Typical Profile

Chocolay
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 3 inches—black very cobbly fine sandy loam
Subsurface layer:
3 to 8 inches—reddish brown very cobbly fine sandy loam
Subsoil:
8 to 14 inches—dark reddish brown very cobbly fine sandy loam
14 to 27 inches—reddish brown, mottled very gravelly sandy loam
Bedrock:
27 inches—reddish brown sandstone

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Chocolay—moderately deep; Waiska—very deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Chocolay—moderate; Waiska—very rapid
Available water capacity: Chocolay—low; Waiska—very low
Drainage class: Chocolay—moderately well drained; Waiska—excessively drained

Surface runoff class: Chocolay—slow; Waiska—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Chocolay soil and similar soils: 50 to 70 percent
Waiska soil and similar soils: 20 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Paavola soils in landscape positions similar to those of the major soils
- The moderately well drained Chabeneau soils in areas that have slopes of less than 4 percent
- The somewhat poorly drained Skanee, poorly drained Jacobsville, and very poorly drained Skandia soils in depressions and drainageways

Similar components:
- Chocolay soils that have bedrock at a depth of more than 40 inches
- Soils in areas where the surface stones are spaced 3 to 25 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- In areas of the Chocolay soil, skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- In areas of the Chocolay soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, cutbanks caving, seasonal wetness
Management considerations:
- In areas of the Chocolay soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock and the water table.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness, poor filtering capacity
Management considerations:
- The Chocolay soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock and the seasonal high water table. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome these limitations.

- The poor filtering capacity of the Waiska soil can result in the pollution of ground water.

166—Skandia mucky peat

Setting

Landform: Depressions and drainageways on sandstone benches
Shape of areas: Elongated or oval
Size of areas: 10 to 60 acres

Typical Profile

Surface tier:
0 to 4 inches—dark grayish brown mucky peat
Subsurface tier:
4 to 26 inches—black muck
Substratum:
26 to 31 inches—dark reddish brown, weathered sandstone
Bedrock:
31 inches—dusky red sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Permeability: Moderately slow to moderately rapid in the organic layers and moderately slow in the weathered sandstone
Available water capacity: Moderate
Drainage class: Very poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Skandia soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Zeba and poorly drained Jacobsville soils in the slightly higher positions on the landscape
- The moderately well drained Chocolay and Sauxhead soils on knolls

Similar components:
- Soils that have bedrock at a depth of more than 51 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.

• Because of wetness, seedling mortality, windthrow hazard, and plant competition, trees are generally not planted on this soil.

Building site development
Major management concerns: Ponding, excess humus, low strength
Management considerations:
• Because of ponding and the instability of the organic material, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, depth to bedrock
Management considerations:
• Because of ponding and the depth to bedrock, this soil is generally unsuited to use as a site for septic tank absorption fields.

167—Skandia-Jacobsville complex, stony

Setting

Landform: Depressions and drainageways on sandstone benches
Shape of areas: Elongated or oval
Size of areas: 5 to 200 acres

Typical Profile

Skandia
Surface tier:
0 to 4 inches—dark grayish brown mucky peat
Subsurface tier:
4 to 26 inches—black muck
Bedrock:
26 to 31 inches—dark reddish brown, weathered sandstone
31 inches—dusky red sandstone

Jacobsville
Surface layer:
0 to 4 inches—black muck
Subsurface layer:
4 to 9 inches—dark gray, mottled loam
Subsoil:
9 to 16 inches—reddish brown, mottled sandy loam
Substratum:
16 to 28 inches—reddish brown, mottled sandy loam
Bedrock:
28 inches—reddish brown sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Skandia—moderately slow to moderately rapid in the organic layers; Jacobsville—moderate
Available water capacity: Skandia—moderate; Jacobsville—low
Drainage class: Skandia—very poorly drained; Jacobsville—poorly drained
Surface runoff class: Very slow or ponded
Flooding: None
Content of organic matter: High

Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Skandia soil and similar soils: 45 to 65 percent
Jacobsville soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Chocolay and Sauxhead soils on knolls
- The somewhat poorly drained Zeba soils in the slightly higher positions on the landscape

Similar components:
- Skandia soils that have bedrock at a depth of more than 51 inches
- Jacobsville soils that are sandy throughout

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- Because of wetness, seedling mortality, windthrow hazard, and plant competition, trees are generally not planted on these soils.

Building site development
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of ponding and the depth to bedrock, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Ponding, depth to bedrock
Management considerations:
- Because of ponding and the depth to bedrock, these soils are generally unsuited to use as sites for septic tank absorption fields.

168B—Yellowdog-Burt complex, 0 to 6 percent slopes

Setting

Landform: Yellowdog—gently undulating areas on upland plains; Burt—nearly level areas in depressions and drainageways on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 5 to 550 acres

Typical Profile

Yellowdog
Organic mat:
0 to 2 inches—black, well decomposed leaf litter
Subsoil:
2 to 32 inches—reddish brown very channery sand

Bedrock:
32 inches—dusky red sandstone

Burt
Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 5 inches—black muck
Subsurface layer:
5 to 7 inches—black mucky loamy sand
7 to 8 inches—reddish gray, mottled gravelly sand
Subsoil:
8 to 18 inches—dark reddish brown, mottled gravelly sand
Bedrock:
18 inches—dark reddish brown sandstone

Soil Properties and Qualities

Depth class: Yellowdog—moderately deep; Burt—shallow
Permeability: Yellowdog—very rapid; Burt—rapid
Available water capacity: Very low
Drainage class: Yellowdog—excessively drained; Burt—poorly drained
Surface runoff class: Yellowdog—very slow; Burt—very slow or ponded
Flooding: None
Content of organic matter: Yellowdog—low; Burt—high
Hazard of water erosion: Slight
Hazard of soil blowing: Yellowdog—severe; Burt—moderate

Map Unit Composition

Yellowdog soil and similar soils: 55 to 75 percent
Burt soil and similar soils: 15 to 30 percent
Dissimilar components: 5 to 10 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Zeba soils in landscape positions lower than those of the Yellowdog soil and higher than those of the Burt soil
- The moderately well drained Sauxhead soils in landscape positions similar to those of the Yellowdog soil

Similar components:
- Soils in areas where the surface stones are 10 to 65 feet apart
- Burt soils that have a subsoil of sandy loam
- Yellowdog soils that have bedrock at a depth of more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table in areas of the Burt soil restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- In areas of the Yellowdog soil, planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Burt soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.

Building site development
Major management concerns: Ponding, cutbanks caving, depth to bedrock
Management considerations:
- Because of ponding and the depth to bedrock, the Burt soil is generally unsuited to building site development.
- Because cutbanks in areas of the Yellowdog soil are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Yellowdog soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Ponding, poor filtering capacity, depth to bedrock
Management considerations:
- Because of ponding, the poor filtering capacity, and the depth to bedrock, these soils are generally unsuited to use as sites for septic tank absorption fields.

170B—Chocolay very cobbly fine sandy loam, 1 to 6 percent slopes, very stony

Setting

Landform: Gently undulating areas on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 5 to 60 acres

Typical Profile

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 3 inches—black very cobbly fine sandy loam
Subsurface layer:
3 to 8 inches—reddish brown very cobbly fine sandy loam
Subsoil:
8 to 14 inches—dark reddish brown very cobbly fine sandy loam
14 to 27 inches—reddish brown, mottled very gravelly sandy loam
Bedrock:
27 inches—reddish brown sandstone

Soil Properties and Qualities

Depth class: Moderately deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Chocolay soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Onota soils in the slightly higher positions on the landscape
- The somewhat poorly drained Zeba and poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils that have a lower content of gravel, cobbles, and stones
- Soils that have bedrock at a depth of more than 40 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, windthrow hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- The seasonal high water table restricts the use of equipment to summer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, seasonal wetness, cutbanks caving
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and bedrock.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- This soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock and the seasonal high water table. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome these limitations.

171B—Paavola very gravelly loamy sand, 1 to 6 percent slopes, stony

Setting

Landform: Gently undulating outwash terraces on ground moraines
Shape of areas: Irregular
Size of areas: 20 to 100 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 8 inches—dark reddish gray very gravelly loamy sand
Subsoil:
8 to 25 inches—dark reddish brown extremely gravelly sand
25 to 33 inches—dark reddish brown extremely cobbly sand
33 to 80 inches—reddish brown, mottled, very firm very cobbly fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Paavola soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska soils on knolls and ridges
- The moderately well drained Chocolay soils in positions on the landscape similar to those of the Paavola soil
- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
- Soils that have a lower content of gravel and cobbles in the upper part
- Soils in areas where the surface stones are 3 to 25 feet apart

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when there is an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

172D—Buckroe-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on sandstone benches
Distinctive landscape features: Outcrops of Jacobsville sandstone
Shape of areas: Irregular
Size of areas: 20 to 400 acres

Typical Profile

Buckroe
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Subsoil:
2 to 4 inches—reddish brown very channery loamy sand
4 to 15 inches—reddish brown very channery sand
Bedrock:
15 inches—dusky red sandstone

Soil Properties and Qualities

Buckroe
Depth class: Shallow
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Buckroe soil and similar soils: 55 to 80 percent

Rock outcrop: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska and well drained Tokiahok soils in landscape positions similar to those of the Buckroe soil
- The poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The rock outcrop should be considered when locations for roads and landing sites are planned.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the depth to bedrock, planting is not practical on the Buckroe soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

Building site development
Major management concerns: Depth to bedrock, slope
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Depth to bedrock, slope
Management considerations:
- The Buckroe soil is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

172F—Buckroe-Rock outcrop complex, 25 to 70 percent slopes, very bouldery

Setting

Landform: Very hilly areas on sandstone benches
Distinctive landscape features: Outcrops of Jacobsville sandstone
Shape of areas: Elongated
Size of areas: 5 to 270 acres

Typical Profile

Buckroe
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Subsoil:
2 to 4 inches—reddish brown very channery loamy sand
4 to 15 inches—reddish brown very channery sand
Bedrock:
15 inches—dusky red sandstone

Soil Properties and Qualities

Buckroe
Depth class: Shallow
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Very rapid
Available water capacity: Very low
Drainage class: Excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Buckroe soil and similar soils: 55 to 80 percent
Rock outcrop: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska and well drained Tokiahok soils in landscape positions similar to those of the Buckroe soil
- The poorly drained Jacobsville soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of more than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on

the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- The rock outcrop should be considered when locations for roads and landing sites are planned.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the depth to bedrock, planting is not practical on the Buckroe soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

173B—Pence fine sandy loam, 1 to 6 percent slopes, rocky, bouldery

Setting

Landform: Gently undulating outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 250 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter
Surface layer:
2 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—dark brown and brown fine sandy loam
13 to 16 inches—strong brown loamy coarse sand
16 to 31 inches—dark yellowish brown coarse sand
Substratum:
31 to 80 inches—dark yellowish brown and yellowish brown, stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid or very rapid in the lower part of the subsoil and in the substratum

Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Pence soil and similar soils: 75 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Pence soil
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have more than 35 percent gravel in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

173D—Pence fine sandy loam, 6 to 18 percent slopes, rocky, bouldery

Setting

Landform: Gently rolling and rolling outwash terraces on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 180 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest litter

Surface layer:
2 to 6 inches—brown fine sandy loam
Subsoil:
6 to 13 inches—dark brown and brown fine sandy loam
13 to 16 inches—strong brown loamy coarse sand
16 to 31 inches—dark yellowish brown coarse sand
Substratum:
31 to 80 inches—dark yellowish brown and yellowish brown, stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Boulders spaced approximately 65 to 120 feet apart
Permeability: Moderately rapid in the surface layer and the upper part of the subsoil and rapid or very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Pence soil and similar soils: 75 to 90 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Michigamme soils in landscape positions similar to those of the Pence soil
- The somewhat poorly drained Channing and poorly drained Minocqua soils in depressions and drainageways

Similar components:
- Soils that have more than 35 percent gravel in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.

174D—Yalmer-Rubicon-Urban land complex, 4 to 18 percent slopes

Setting

Landform: Gently rolling and rolling areas on till-floored lake plains
Shape of areas: Irregular
Size of areas: 10 to 310 acres

Typical Profile

Yalmer
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 10 inches—reddish gray fine sand
Subsoil:
10 to 30 inches—dark reddish brown and reddish brown fine sand
30 to 36 inches—mottled, very firm dark reddish gray loamy fine sand and reddish brown fine sandy loam
36 to 80 inches—mottled, very firm reddish brown fine sandy loam and dark reddish gray loamy fine sand

Rubicon
Surface layer:
0 to 1 inch—black sand
Subsurface layer:
1 to 7 inches—pinkish gray sand
Subsoil:
7 to 38 inches—brown and strong brown sand
Substratum:
38 to 80 inches—light brown sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Yalmer—rapid in the surface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Rubicon—rapid
Available water capacity: Low
Drainage class: Yalmer—moderately well drained; Rubicon—excessively drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Severe

Map Unit Composition

Yalmer soil and similar soils: 30 to 45 percent

Rubicon soil and similar soils: 25 to 40 percent
Urban land: 15 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Frohling and Tokiahok soils in landscape positions similar to those of the major soils
- The poorly drained Deford soils in depressions and drainageways
- Areas of igneous and metamorphic rock outcrops

Similar components:
- Yalmer soils that are fine sandy loam in the surface layer and the upper part of the subsoil
- Rubicon soils that are stratified very fine sandy loam and loamy very fine sand in the substratum

Use and Management

Land use: Yalmer and Rubicon—residential, commercial, and industrial sites; Urban land—streets, parking lots, buildings, and other manmade structures

Gardens, lawns, and environmental plantings
Major management concerns: Droughtiness, soil blowing
Management considerations:
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- A good plant cover and mulch can help to control soil blowing.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas of the Yalmer soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- In urban areas, onsite investigation is necessary to determine the suitability for building site development.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability, poor filtering capacity, slope
Management considerations:
- In areas of the Yalmer soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Yalmer soil.
- The poor filtering capacity of the Rubicon soil can result in the pollution of ground water.
- Land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Where possible, sanitary facilities should be connected to public sewers and sewage treatment facilities.

175E—Kalkaska-Waiska complex, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 10 to 70 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Waiska—very rapid
Available water capacity: Kalkaska—low; Waiska—very low
Drainage class: Kalkaska—somewhat excessively drained; Waiska—excessively drained
Surface runoff class: Kalkaska—slow; Waiska—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Kalkaska—severe; Waiska—moderate

Map Unit Composition

Kalkaska soil and similar soils: 50 to 70 percent
Waiska soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:

- The well drained Alcona, Garlic, and Voelker soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils on the bottom of ravines

Similar components:
- Kalkaska soils that have bands of loamy sand in the lower part of the subsoil
- Soils in areas where the surface stones are spaced approximately 65 to 120 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- In areas of the Kalkaska soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized and built on the contour.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, slope
Management considerations:
- The poor filtering capacity of these soils can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

175F—Kalkaska-Waiska complex, 15 to 70 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel,

are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 20 to 400 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Waiska
Surface layer:
0 to 1 inch—black cobbly loamy sand
Subsurface layer:
1 to 4 inches—reddish gray cobbly loamy sand
Subsoil:
4 to 14 inches—dark reddish brown and reddish brown very cobbly loamy sand
14 to 36 inches—yellowish red very cobbly sand
Substratum:
36 to 80 inches—brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Waiska—very rapid
Available water capacity: Kalkaska—low; Waiska—very low
Drainage class: Kalkaska—somewhat excessively drained; Waiska—excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Kalkaska—severe; Waiska—moderate

Map Unit Composition

Kalkaska soil and similar soils: 50 to 70 percent
Waiska soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Alcona, Garlic, and Voelker soils in landscape positions similar to those of the major soils
- The somewhat poorly drained Au Gres and poorly drained Deford soils on the bottom of ravines

Similar components:
- Kalkaska soils that have bands of loamy sand in the lower part of the subsoil

- Soils in areas where the surface stones are spaced approximately 65 to 120 feet apart

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Seeding logging roads, skid roads, and landings after the trees are logged also helps to prevent excessive soil loss.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines.
- Cable yarding systems are generally safer than other logging methods and result in less surface disturbance.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.

Building site development
Major management concerns: Slope
Management considerations:
- These soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

176B—Greenwood-Croswell complex, 0 to 6 percent slopes

Setting

Landform: Greenwood—nearly level areas in bogs on outwash plains and till-floored lake plains; Croswell—gently undulating areas on knolls and ridges on outwash plains and till-floored lake plains
Shape of areas: Elongated or irregular
Size of areas: 20 to 1,000 acres

Typical Profile

Greenwood
Surface tier:
0 to 8 inches—dark brown peat
Subsurface tier:
8 to 11 inches—black muck

Bottom tier:
11 to 65 inches—very dark brown mucky peat
65 to 80 inches—dark brown mucky peat

Croswell
Surface layer:
0 to 3 inches—very dark brown sand
Subsurface layer:
3 to 7 inches—pinkish gray sand
Subsoil:
7 to 22 inches—reddish brown and yellowish red sand
22 to 34 inches—strong brown, mottled sand
Substratum:
34 to 70 inches—light brown, mottled sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Greenwood—moderate or moderately rapid; Croswell—rapid
Available water capacity: Greenwood—very high; Croswell—low
Drainage class: Greenwood—very poorly drained; Croswell—moderately well drained
Surface runoff class: Greenwood—very slow or ponded; Croswell—very slow
Flooding: None
Content of organic matter: Greenwood—high; Croswell—low
Hazard of water erosion: Slight
Hazard of soil blowing: Greenwood—moderate; Croswell—severe

Map Unit Composition

Greenwood soil and similar soils: 50 to 70 percent
Croswell soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Au Gres soils in areas between the Greenwood and Croswell soils
- The excessively drained Rubicon soils on knolls and ridges
- The poorly drained Kinross soils in depressions

Similar components:
- Greenwood soils in which the organic layers are less than 51 inches thick
- Croswell soils that have gravelly textures in the subsoil and substratum

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of wetness and low strength in areas of the Greenwood soil, special harvesting equipment is needed. The equipment can be used only during periods in winter when skid roads and access roads are frozen.
- In areas of the Croswell soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Greenwood soil.

- Planting seedlings that can withstand droughty conditions can lower the seedling mortality rate in areas of the Croswell soil. Replanting is needed in some areas.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- If trees are planted on the Croswell soil, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Ponding, excess humus, seasonal wetness, cutbanks caving

Management considerations:

- Because of ponding and the instability of the organic material, the Greenwood soil is generally unsuited to building site development.
- In areas of the Croswell soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields

Major management concerns: Ponding, excess humus, poor filtering capacity, seasonal wetness

Management considerations:

- Because of ponding and the instability of the organic material, the Greenwood soil is generally unsuited to use as a site for septic tank absorption fields.
- The poor filtering capacity of the Croswell soil can result in the pollution of ground water.
- Mounding or adding suitable fill material helps to raise the absorption field above the water table in areas of the Croswell soil.

177E—Frohling fine sandy loam, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on till-floored lake plains and dissected moraines

Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.

Shape of areas: Irregular or elongated

Size of areas: 10 to 80 acres

Typical Profile

Organic mat:

0 to 1 inch—black, partially decomposed forest litter

Surface layer:

1 to 2 inches—very dark gray fine sandy loam

Subsurface layer:

2 to 7 inches—reddish gray fine sandy loam

Subsoil:

7 to 9 inches—dark reddish brown fine sandy loam

9 to 16 inches—reddish brown fine sandy loam

16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska and well drained Keweenaw soils in landscape positions similar to those of the Frohling soil
- Somewhat poorly drained and poorly drained, loamy soils on the bottom of ravines

Similar components:
- Soils in areas where the surface stones are spaced approximately 65 to 120 feet apart
- Soils that have a substratum of sand
- Soils that are sand in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Restricted permeability, slope
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

177F—Frohling fine sandy loam, 15 to 70 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on till-floored lake plains and dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Elongated or irregular
Size of areas: 20 to 200 acres

Typical Profile

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low

Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Kalkaska and well drained Keweenaw soils in landscape positions similar to those of the Frohling soil
- Somewhat poorly drained and poorly drained, loamy soils on the bottom of ravines

Similar components:
- Soils in areas where the surface stones are spaced 65 to 120 feet apart
- Soils that have a substratum of sand
- Soils that are sand in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Seeding logging roads, skid roads, and landings after the trees are logged also helps to prevent excessive soil loss.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this soil is generally unsuited to use as a site for septic tank absorption fields.

178D—Schweitzer-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very stony

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 10 to 150 acres

Typical Profile

Schweitzer
Surface layer:
0 to 1 inch—black cobbly very fine sandy loam
Subsurface layer:
1 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 21 inches—dark reddish brown and brown cobbly very fine sandy loam
21 to 43 inches—reddish brown, very firm very cobbly sandy loam and very cobbly loamy sand
43 to 61 inches—reddish brown, firm very cobbly sandy loam and very cobbly loamy sand
Substratum:
61 to 80 inches—reddish brown very cobbly loamy sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Schweitzer—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Kalkaska—rapid
Available water capacity: Low
Drainage class: Schweitzer—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Schweitzer—medium; Kalkaska—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Schweitzer—moderate; Kalkaska—severe

Map Unit Composition

Schweitzer soil and similar soils: 45 to 60 percent
Kalkaska soil and similar soils: 15 to 35 percent

Rock outcrop: 10 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska soils in landscape positions similar to those of the major soils
- The well drained Michigamme soils near the rock outcrops
- The moderately well drained Gogebic soils in landscape positions slightly lower than those of the Schweitzer soil
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Schweitzer soils that are sand in the surface layer and subsurface layer and the upper part of the subsoil
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- In areas of the Kalkaska soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes.
- Skidders should not be used on the Schweitzer soil during wet periods, when ruts form easily. Culverts are needed to maintain the natural drainage system. Year-round logging roads require roadfill and gravel.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- The rock outcrop should be considered when locations for roads and landing sites are planned.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Caving of cutbanks is a concern affecting shallow excavations in areas of the Kalkaska soil. Trench walls should be reinforced.

- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope, restricted permeability, poor filtering capacity
Management considerations:
- In areas of the Schweitzer soil, enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

178F—Schweitzer-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very stony

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 10 to 200 acres

Typical Profile

Schweitzer
Surface layer:
0 to 1 inch—black cobbly very fine sandy loam
Subsurface layer:
1 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 21 inches—dark reddish brown and brown cobbly very fine sandy loam
21 to 43 inches—reddish brown, very firm very cobbly sandy loam and very cobbly loamy sand
43 to 61 inches—reddish brown, firm very cobbly sandy loam and very cobbly loamy sand
Substratum:
61 to 80 inches—reddish brown very cobbly loamy sand

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Schweitzer—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Kalkaska—rapid
Available water capacity: Low
Drainage class: Schweitzer—well drained; Kalkaska—somewhat excessively drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Schweitzer—moderate; Kalkaska—severe

Map Unit Composition

Schweitzer soil and similar soils: 45 to 60 percent
Kalkaska soil and similar soils: 15 to 35 percent
Rock outcrop: 10 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Waiska soils in landscape positions similar to those of the major soils
- The well drained Michigamme soils near the rock outcrops
- The moderately well drained Gogebic soils in areas that have slopes of less than 18 percent
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Schweitzer soils that are sand in the surface layer and subsurface layer and the upper part of the subsoil
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- In areas of the Kalkaska soil, loose sand and the slope can hinder the traction of wheeled equipment. Skid roads should be built on the contour or on the gentler slopes.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely because of the slope. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Large stones on the surface can hinder harvesting operations and damage equipment.

- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- The rock outcrop should be considered when locations for roads and landing sites are planned.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, this map unit is generally unsuited to use as a site for septic tank absorption fields.

179E—Schweitzer-Michigamme complex, 18 to 35 percent slopes, rocky, very stony

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular or elongated
Size of areas: 10 to 100 acres

Typical Profile

Schweitzer
Surface layer:
0 to 1 inch—black cobbly very fine sandy loam
Subsurface layer:
1 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 21 inches—dark reddish brown and brown cobbly very fine sandy loam
21 to 43 inches—reddish brown, very firm very cobbly sandy loam and very cobbly loamy sand
43 to 61 inches—reddish brown, firm very cobbly sandy loam and very cobbly loamy sand
Substratum:
61 to 80 inches—reddish brown very cobbly loamy sand

Michigamme

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Schweitzer—very deep; Michigamme—moderately deep to igneous or metamorphic bedrock
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Schweitzer—moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum; Michigamme—moderate
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Schweitzer soil and similar soils: 50 to 70 percent
Michigamme soil and similar soils: 20 to 35 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Tula and poorly drained Pleine soils in depressions and drainageways
- The moderately well drained Gogebic soils in areas that have slopes of less than 18 percent

Similar components:
- Schweitzer soils that are sand in the surface layer, subsurface layer, and subsoil
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.

- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope, depth to bedrock
Management considerations:
- Because of the slope and the depth to bedrock, these soils are poorly suited to building site development.

Septic tank absorption fields
Major management concerns: Slope, restricted permeability, depth to bedrock
Management considerations:
- Because of the slope, the restricted permeability, and the depth to bedrock, these soils are poorly suited to use as sites for septic tank absorption fields.

180E—Kalkaska-Frohling complex, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on till-floored lake plains and dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 125 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Frohling
Organic mat:
0 to 1 inch—black, partially decomposed forest litter

Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Kalkaska—somewhat excessively drained; Frohling—well drained
Surface runoff class: Kalkaska—slow; Frohling—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Kalkaska—severe; Frohling—moderate

Map Unit Composition

Kalkaska soil and similar soils: 45 to 60 percent
Frohling soil and similar soils: 25 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well Munising soils in areas that have slopes of less than 18 percent
- The excessively drained Waiska soils in landscape positions similar to those of the major soils
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines

Similar components:
- Frohling soils that are sand in the surface layer, subsurface layer, and the upper part of the subsoil
- Kalkaska soils that have more than 50 percent ortstein in the subsoil
- Kalkaska soils that have bands of loamy sand in the lower part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.

- In areas of the Kalkaska soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- In areas of the Frohling soil, skidders should not be used during wet periods, when ruts form easily. Culverts are needed to maintain the natural drainage system. Year-round logging roads require roadfill and gravel.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- In areas of the Kalkaska soil, planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- In areas of the Frohling soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, restricted permeability, slope
Management considerations:
- The poor filtering capacity of the Kalkaska soil can result in the pollution of ground water.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Frohling soil.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

180F—Kalkaska-Frohling complex, 15 to 70 percent slopes, dissected

Setting

Landform: Moderately steep to very steep areas on till-floored lake plains and dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 15 to 225 acres

Typical Profile

Kalkaska
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish gray sand
Subsoil:
6 to 17 inches—dark reddish brown and reddish brown sand
17 to 32 inches—strong brown sand
Substratum:
32 to 80 inches—brown sand

Frohling
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Kalkaska—rapid; Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil
Available water capacity: Low
Drainage class: Kalkaska—somewhat excessively drained; Frohling—well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Kalkaska—severe; Frohling—moderate

Map Unit Composition

Kalkaska soil and similar soils: 45 to 60 percent
Frohling soil and similar soils: 25 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keweenaw and excessively drained Waiska soils in landscape positions similar to those of the major soils
- The moderately well drained Munising soils in areas that have slopes of less than 18 percent
- Somewhat poorly drained and poorly drained, loamy and sandy soils on the bottom of ravines

Similar components:
- Frohling soils that are sand in the surface layer, subsurface layer, and the upper part of the subsoil
- Kalkaska soils that have more than 50 percent ortstein in the subsoil

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- In areas of the Kalkaska soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- In areas of the Frohling soil, skidders should not be used during wet periods, when ruts form easily. Culverts are needed to maintain the natural drainage system. Year-round logging roads require roadfill and gravel.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- In areas of the Kalkaska soil, planting seedlings that can withstand droughty conditions can lower the seedling mortality rate. Replanting is needed in some areas.
- In areas of the Frohling soil, windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development

Major management concerns: Slope

Management considerations:

- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields

Major management concerns: Slope

Management considerations:

- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

181E—Frohling-Tokiahok complex, 8 to 35 percent slopes, dissected, very stony

Setting

Landform: Moderately sloping to steep areas on till-floored lake plains and dissected moraines

Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.

Shape of areas: Irregular or elongated
Size of areas: 15 to 300 acres

Typical Profile

Frohling
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Tokiahok
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 11 inches—reddish gray loamy fine sand
Subsoil:
11 to 24 inches—dark reddish brown and brown loamy fine sand
24 to 30 inches—strong brown, very firm fine sandy loam
30 to 49 inches—reddish brown, very firm loamy sand and sandy loam
49 to 59 inches—dark reddish brown, very firm sandy loam
59 to 66 inches—reddish brown sandy loam
Substratum:
66 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Tokiahok—rapid in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 50 to 65 percent
Tokiahok soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Onota and Keweenaw soils and the somewhat excessively drained Kalkaska soils in landscape positions similar to those of the major soils

• Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines

Similar components:
• Soils that have gravelly textures in the surface layer and subsurface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
• The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
• Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
• Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
• Large stones on the surface can hinder harvesting operations and damage equipment.
• Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
• Seedling survival rates can be increased by carefully planting vigorous nursery stock.
• Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
• If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
• Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
• In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
• Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope, restricted permeability
Management considerations:
• Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
• In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
• Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

181F—Frohling-Tokiahok complex, 15 to 70 percent slopes, dissected, very stony

Setting

Landform: Moderately steep to very steep areas on till-floored lake plains and dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately steep or steep and are 15 to 100 feet wide. The ravines are dominantly parallel, are 15 to 50 feet deep and 40 to 150 feet wide, and have steep or very steep side slopes. The ravine bottoms are 15 to 50 feet wide. Some have seasonal streams.
Shape of areas: Irregular or elongated
Size of areas: 10 to 280 acres

Typical Profile

Frohling
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Tokiahok
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 11 inches—reddish gray loamy fine sand
Subsoil:
11 to 24 inches—dark reddish brown and brown loamy fine sand
24 to 30 inches—strong brown, very firm fine sandy loam
30 to 49 inches—reddish brown, very firm loamy sand and sandy loam
49 to 59 inches—dark reddish brown, very firm sandy loam
59 to 66 inches—reddish brown sandy loam
Substratum:
66 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Tokiahok—rapid in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None

Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 50 to 65 percent
Tokiahok soil and similar soils: 20 to 40 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Onota and Keweenaw soils and the somewhat excessively drained Kalkaska soils in landscape positions similar to those of the major soils
- Somewhat poorly drained and poorly drained, sandy and loamy soils on the bottom of ravines

Similar components:
- Soils that have gravelly textures in the surface layer and subsurface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on the very steep side slopes of the ravines. As a result, special logging methods, such as yarding the logs with a cable, may be needed.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Seedling survival rates can be increased by carefully planting vigorous nursery stock.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Slope

Management considerations:

- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

184C—Dishno-Witbeck-Rock outcrop complex, 0 to 12 percent slopes, very bouldery

Setting

Landform: Dishno—gently sloping areas on knolls and low ridges on bedrock-controlled moraines; Witbeck—nearly level areas in depressions and drainageways on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 300 acres

Typical Profile

Dishno
Organic mat:
0 to 1 inch—dark reddish brown, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Witbeck
Surface layer:
0 to 8 inches—black very stony muck
Subsurface layer:
8 to 12 inches—gray very stony fine sandy loam
Subsoil:
12 to 15 inches—greenish gray, mottled very stony very fine sandy loam
15 to 22 inches—dark olive gray, mottled very stony fine sandy loam
22 to 24 inches—olive gray, mottled gravelly fine sandy loam
Substratum:
24 to 80 inches—dark gray gravelly sandy loam

Soil Properties and Qualities

Depth class: Dishno—deep to igneous or metamorphic bedrock; Witbeck—very deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum; Witbeck—moderate
Available water capacity: Dishno—low; Witbeck—moderate
Drainage class: Dishno—moderately well drained; Witbeck—poorly drained

Surface runoff class: Dishno—slow; Witbeck—very slow or ponded
Flooding: None
Content of organic matter: Dishno—low; Witbeck—moderate
Hazard of water erosion: Off-road—slight; on roads and trails—moderate in areas of the Dishno soil and slight in areas of the Witbeck soil
Hazard of soil blowing: Moderate

Map Unit Composition

Dishno soil and similar soils: 40 to 70 percent
Witbeck soil and similar soils: 15 to 35 percent
Rock outcrop: 10 to 20 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Net and Channing soils in areas between the Dishno and Witbeck soils
- The well drained Keewaydin soils in landscape positions similar to those of the Dishno soil
- The very poorly drained Cathro soils in landscape positions similar to those of the Witbeck soil

Similar components:
- Witbeck soils that have a substratum of sand or gravelly sand
- Soils that have bedrock at a depth of less than 40 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- In areas of the Dishno soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of wetness and low strength in areas of the Witbeck soil, equipment should be used only during periods in winter when the snow cover is adequate.
- The rock outcrop and large stones and boulders may interfere with the use of harvesting equipment and the placement of haul roads.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Witbeck soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, depth to bedrock, ponding
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

- In areas of the Dishno soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.
- Because of ponding, the Witbeck soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Seasonal wetness, depth to bedrock, ponding, restricted permeability
Management considerations:
- In areas of the Dishno soil, filling or mounding with suitable material helps to raise the absorption field above the water table and the bedrock.
- Because of ponding and the large amount of stones and boulders, the Witbeck soil is generally unsuited to use as a site for septic tank absorption fields.

185B—Northland loamy fine sand, 0 to 4 percent slopes

Setting

Landform: Nearly level and gently undulating outwash terraces on drumlinized ground moraines
Shape of areas: Oval or irregular
Size of areas: 5 to 65 acres

Typical Profile

Organic mat:
0 to 3 inches—black, partially decomposed forest litter
Surface layer:
3 to 5 inches—pinkish gray loamy fine sand
Subsoil:
5 to 8 inches—strong brown fine sandy loam
8 to 18 inches—brown sandy loam
18 to 22 inches—reddish brown very gravelly loamy coarse sand
22 to 38 inches—brown, mottled very gravelly sand
Substratum:
38 to 80 inches—brown, mottled very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Northland soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Nadeau, Emmet, and Onaway soils in the higher positions on the landscape
- The poorly drained Ensley and Minocqua soils in depressions and drainageways

Similar components:
- Soils that have a surface layer of sand
- Soils that have less than 35 percent rock fragments in the lower part of the subsoil and in the substratum

Use and Management

Woodland
Major management concerns: Equipment limitations, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving and seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns:
Management considerations: Poor filtering capacity, seasonal wetness
- The poor filtering capacity of this soil can result in the pollution of ground water.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

187B—Reade silt loam, 0 to 4 percent slopes

Setting

Landform: Nearly level and gently undulating areas on ground moraines
Shape of areas: Irregular
Size of areas: 5 to 100 acres

Typical Profile

Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 7 inches—brown silt loam
Subsoil:
7 to 12 inches—dark brown loam and fine sandy loam
12 to 15 inches—brown, mottled fine sandy loam
15 to 20 inches—reddish brown, mottled fine sandy loam and loamy fine sand
20 to 28 inches—reddish brown, mottled gravelly fine sandy loam

Bedrock:
28 inches—grayish brown dolomitic sandstone

Soil Properties and Qualities

Depth class: Moderately deep to dolomitic sandstone, dolomite, and limestone
Permeability: Moderate
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Reade soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Shoepac soils in landscape positions similar to those of the Reade soil
- The well drained Trenary soils in the slightly higher positions on the landscape
- The somewhat poorly drained Sundell and poorly drained Nahma soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock, seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock and the water table.

Septic tank absorption fields
Major management concerns: Depth to bedrock, seasonal wetness, restricted permeability
Management considerations:
- This soil is poorly suited to use as a site for septic tank absorption fields because of the depth to bedrock, seasonal wetness, and the restricted permeability.

Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding or adding suitable filtering material helps to raise the absorption field above the water table and bedrock. Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

190B—Emmet-Cunard fine sandy loams, 1 to 6 percent slopes, stony

Setting

Landform: Gently undulating areas on ground moraines
Shape of areas: Irregular
Size of areas: 15 to 400 acres

Typical Profile

Emmet
Surface layer:
0 to 3 inches—black fine sandy loam
Subsurface layer:
3 to 5 inches—dark grayish brown fine sandy loam
Subsoil:
5 to 21 inches—brown fine sandy loam
21 to 28 inches—yellowish red fine sandy loam
Substratum:
28 to 80 inches—brown gravelly fine sandy loam

Cunard
Surface layer:
0 to 4 inches—black fine sandy loam
Subsurface layer:
4 to 6 inches—brown fine sandy loam
Subsoil:
6 to 10 inches—brown fine sandy loam
10 to 19 inches—dark brown loam
Substratum:
19 to 27 inches—brown gravelly fine sandy loam
Bedrock:
27 inches—dolomitic sandstone

Soil Properties and Qualities

Depth class: Emmet—very deep; Cunard—moderately deep to dolomitic sandstone and dolomite
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Emmet—moderate in the surface layer, subsurface layer, and subsoil and moderately slow in the substratum; Cunard—moderate
Available water capacity: Emmet—moderate; Cunard—low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Emmet soil and similar soils: 45 to 60 percent
Cunard soil and similar soils: 25 to 45 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Sundell soils and the poorly drained Nahma and Ensley soils in depressions and drainageways
- The moderately well drained Reade soils in the slightly lower positions on the landscape

Similar components:
- Cunard soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Depth to bedrock
Management considerations:
- In areas of the Cunard soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Restricted permeability, depth to bedrock
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Emmet soil.
- The Cunard soil is poorly suited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.

191B—Nahma-Sundell complex, 0 to 4 percent slopes

Setting

Landform: Nearly level and gently undulating areas on ground moraines
Shape of areas: Irregular
Size of areas: 10 to 250 acres

Typical Profile

Nahma
Surface layer:
0 to 11 inches—black muck
Subsurface layer:
11 to 14 inches—very dark grayish brown mucky loam
Subsoil:
14 to 17 inches—dark gray, mottled loam
17 to 19 inches—brown, mottled loam
Substratum:
19 to 24 inches—brown, mottled gravelly fine sandy loam
Bedrock:
24 inches—dolomitic sandstone

Sundell
Organic mat:
0 to 1 inch—well decomposed forest litter
Surface layer:
1 to 8 inches—black, mottled loam
Subsurface layer:
8 to 11 inches—brown and black, mottled fine sandy loam
Subsoil:
11 to 17 inches—brown, mottled fine sandy loam
Substratum:
17 to 22 inches—light brown, mottled gravelly fine sandy loam
Bedrock:
22 inches—pale brown dolomite

Soil Properties and Qualities

Depth class: Moderately deep to dolomite and dolomitic sandstone
Permeability: Moderate
Available water capacity: Low
Drainage class: Nahma—poorly drained; Sundell—somewhat poorly drained
Surface runoff class: Nahma—very slow or ponded; Sundell—very slow
Flooding: None
Content of organic matter: Nahma—moderate; Sundell—low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Nahma soil and similar soils: 50 to 70 percent
Sundell soil and similar soils: 20 to 40 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Cunard soils on low ridges and knolls
- The moderately well drained Mashek and Reade soils in the slightly higher positions on the landscape

Similar components:
- Soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Nahma soils in which the organic layers are more than 15 inches thick

Use and Management

Woodland

Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:

- Because of wetness and low strength, special harvesting equipment is needed in areas of the Nahma soil. Equipment can be used only during periods in winter when skid roads and access roads are frozen.
- The seasonal high water table in areas of the Sundell soil restricts the use of equipment to midsummer, when the soil is dry, or midwinter, when the soil is frozen or has an adequate snow cover.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Nahma soil.
- Trees that can withstand seasonal wetness should be selected for planting on the Sundell soil.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development

Major management concerns: Ponding, seasonal wetness, depth to bedrock

Management considerations:

- Because of ponding, the Nahma soil is generally unsuited to building site development.
- In areas of the Sundell soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table and the bedrock.

Septic tank absorption fields

Major management concerns: Ponding, seasonal wetness, depth to bedrock

Management considerations:

- Because of ponding, the Nahma soil is generally unsuited to use as a site for septic tank absorption fields.
- The Sundell soil is poorly suited to use as a site for septic tank absorption fields because of the depth to bedrock and the seasonal wetness. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby groundwater supplies. Mounding with a suitable filtering material raises the absorption field above the bedrock and the water table.

193E—Frohling-Tokiahok complex, 18 to 35 percent slopes

Setting

Landform: Very hilly areas on till-floored lake plains

Shape of areas: Irregular

Size of areas: 10 to 30 acres

Typical Profile

Frohling

Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Tokiahok

Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 11 inches—reddish gray loamy fine sand
Subsoil:
11 to 24 inches—dark reddish brown and brown loamy fine sand
24 to 30 inches—strong brown, very firm fine sandy loam
30 to 49 inches—reddish brown, very firm loamy sand and sandy loam
49 to 59 inches—dark reddish brown, very firm sandy loam
59 to 66 inches—reddish brown sandy loam
Substratum:
66 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Tokiahok—rapid in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 40 to 60 percent
Tokiahok soil and similar soils: 25 to 45 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keweenaw and somewhat excessively drained Kalkaska soils in landscape positions similar to those of the major soils
- The moderately well drained Munising and Yalmer soils in areas that have slopes of less than 18 percent

- The somewhat poorly drained Skanee and poorly drained Gay soils in depressions and drainageways

Similar components:
- Soils in areas where the surface stones are spaced 25 to 65 feet apart
- Soils that have gravelly and cobbly textures in the surface layer and subsurface layer and the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to use as sites for septic tank absorption fields.

194E—Sporley silt loam, 8 to 35 percent slopes, dissected

Setting

Landform: Moderately sloping to steep areas on dissected moraines and till-floored lake plains
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.

Shape of areas: Irregular or elongated
Size of areas: 10 to 150 acres

Typical Profile

Organic mat:
0 to 2 inches—black, partially decomposed forest leaf litter
Surface layer:
2 to 6 inches—reddish brown silt loam
Subsoil:
6 to 16 inches—dark reddish brown and strong brown silt loam
16 to 45 inches—dark reddish gray very fine sandy loam and reddish brown silt loam
Substratum:
45 to 80 inches—stratified, reddish brown silt and silt loam and dark reddish brown silty clay

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderately slow
Available water capacity: High
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Sporley soil and similar soils: 85 to 95 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- Somewhat poorly drained and poorly drained, loamy soils on the bottom of ravines
- The well drained Garlic and Voelker soils in landscape positions similar to those of the Sporley soil
- The moderately well drained Fence soils on footslopes near the bottom of ravines

Similar components:
- Soils that have a subsoil of fine sandy loam

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Special harvest methods may be needed to control undesirable plants.

- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, slope
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Restricted permeability, slope
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

196E—Frohling-Onota-Tokiahok complex, 8 to 35 percent slopes, dissected, stony

Setting

Landform: Moderately sloping to steep areas on dissected moraines
Distinctive landscape features: Dissected uplands with ridgetops that are moderately sloping and are 25 to 200 feet wide. The ravines are dominantly parallel, are 10 to 30 feet deep and 20 to 100 feet wide, and have moderately steep or steep side slopes. The ravine bottoms are 5 to 30 feet wide. Some have seasonal streams.
Shape of areas: Irregular
Size of areas: 50 to 380 acres

Typical Profile

Frohling
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 2 inches—very dark gray fine sandy loam
Subsurface layer:
2 to 7 inches—reddish gray fine sandy loam
Subsoil:
7 to 9 inches—dark reddish brown fine sandy loam
9 to 16 inches—reddish brown fine sandy loam
16 to 80 inches—reddish brown, very firm fine sandy loam and loamy fine sand

Onota
Organic mat:
0 to 1 inch—undecomposed forest litter

Surface layer:
1 to 2 inches—black gravelly sandy loam
Subsurface layer:
2 to 7 inches—reddish gray gravelly sandy loam
Subsoil:
7 to 22 inches—dark reddish brown gravelly sandy loam
Bedrock:
22 inches—dark reddish brown sandstone

Tokiahok
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 11 inches—reddish gray loamy fine sand
Subsoil:
11 to 24 inches—dark reddish brown and brown loamy fine sand
24 to 30 inches—strong brown, very firm fine sandy loam
30 to 49 inches—reddish brown, very firm loamy sand and sandy loam
49 to 59 inches—dark reddish brown, very firm sandy loam
59 to 66 inches—reddish brown sandy loam
Substratum:
66 to 80 inches—reddish brown sandy loam

Soil Properties and Qualities

Depth class: Frohling and Tokiahok—very deep; Onota—moderately deep to sandstone bedrock
Rock fragments on the surface: Stones spaced approximately 26 to 65 feet apart
Permeability: Frohling—moderate in the surface layer and subsurface layer and the upper part of the subsoil and very slow in the lower part of the subsoil; Onota—moderate; Tokiahok—rapid in the surface layer and the upper part of the subsoil, very slow in the middle part of the subsoil, and moderate in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—moderate; on roads and trails—severe
Hazard of soil blowing: Moderate

Map Unit Composition

Frohling soil and similar soils: 35 to 55 percent
Onota soil and similar soils: 20 to 35 percent
Tokiahok soil and similar soils: 10 to 30 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat excessively drained Yellowdog soils on ridges and side slopes near the Onota soil
- The moderately well drained Munising and Yalmer soils on footslopes near the bottom of ravines
- The poorly drained Jacobsville soils on the bottom of ravines and in drainageways
- Areas of rock outcrop on side slopes of ravines

Similar components:
- Frohling and Tokiahok soils that have gravelly textures in the surface layer and subsurface layer and the upper part of the subsoil
- Onota soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition

Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Locating logging roads and skid roads in the less sloping areas between the ravines or diagonally across the side slopes helps to control erosion and reduces the equipment limitation.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development

Major management concerns: Cutbanks caving, depth to bedrock, slope

Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Onota soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields

Major management concerns: Restricted permeability, depth to bedrock, slope

Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Frohling and Tokiahok soils.
- The Onota soil is poorly suited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.
- In areas where slopes are less than 15 percent, land shaping, pressurizing the absorption field, and installing the distribution lines on the contour help to overcome the slope.
- Areas that have slopes of more than 15 percent are poorly suited to use as sites for septic tank absorption fields.

197B—Shoepac-Trenary silt loams, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on fluted ground moraines
Shape of areas: Irregular
Size of areas: 10 to 700 acres

Typical Profile

Shoepac
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish brown silt loam
Subsoil:
6 to 12 inches—brown fine sandy loam
12 to 23 inches—strong brown loamy sand
23 to 33 inches—reddish brown, mottled, firm loamy sand and fine sandy loam
33 to 53 inches—reddish brown, firm fine sandy loam
Substratum:
53 to 80 inches—reddish brown gravelly fine sandy loam

Trenary
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—reddish gray silt loam
Subsoil:
5 to 15 inches—dark reddish brown silt loam and reddish brown fine sandy loam
15 to 21 inches—brown and reddish brown, very firm fine sandy loam
21 to 48 inches—reddish brown loamy fine sand and fine sandy loam
Substratum:
48 to 80 inches—reddish brown cobbly fine sandy loam

Soil Properties and Qualities

Depth class: Very deep
Permeability: Shoepac—moderate in the surface layer and subsoil and moderately slow in the substratum; Trenary—moderate
Available water capacity: Moderate
Drainage class: Shoepac—moderately well drained; Trenary—well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Shoepac soil and similar soils: 60 to 80 percent
Trenary soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The somewhat poorly drained Charlevoix and poorly drained Ensley soils in depressions and drainageways

- The well drained Traunik soils in landscape positions similar to those of the major soils

Similar components:
- Soils that have bedrock at a depth of 60 to 80 inches
- Soils that are sand in the surface layer and subsurface layer and the upper part of the subsoil
- Shoepac soils that have a very firm subsoil and are very slowly permeable

Use and Management

Land use: Dominant use—woodland; other uses—cropland, pasture, building site development

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- Equipment should be used only when the soils are relatively dry or have an adequate snow cover.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Cropland
Major management concerns: Seasonal wetness, water erosion, compaction, tilth, content of organic matter
Management considerations:
- Subsurface drains can reduce the wetness if a suitable outlet is available.
- Crop rotations that include close-growing crops, conservation tillage, grassed waterways, cover crops, and crop residue management help to prevent excessive soil loss.
- Minimizing tillage and tilling and harvesting at the proper soil moisture content help to prevent excessive compaction and maintain tilth.
- Keeping crop residue on the surface, regularly adding other organic material, and applying a system of no-till planting increase the content of organic matter.

Pasture
Major management concerns: Compaction, overgrazing, seasonal wetness
Management considerations:
- Proper stocking rates, a planned grazing system, and deferred grazing during wet periods help to keep the pasture in good condition.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Shoepac soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Seasonal wetness, restricted permeability

Management considerations:
- In areas of the Shoepac soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.

198B—Shoepac-Reade silt loams, 1 to 4 percent slopes

Setting

Landform: Nearly level and gently sloping areas on fluted ground moraines
Shape of areas: Irregular
Size of areas: 10 to 700 acres

Typical Profile

Shoepac
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 6 inches—reddish brown silt loam
Subsoil:
6 to 12 inches—brown fine sandy loam
12 to 23 inches—strong brown loamy sand
23 to 33 inches—reddish brown, mottled, firm loamy sand and fine sandy loam
33 to 53 inches—reddish brown, firm fine sandy loam
Substratum:
53 to 80 inches—reddish brown gravelly fine sandy loam

Reade
Organic mat:
0 to 4 inches—black, well decomposed forest litter
Surface layer:
4 to 7 inches—brown silt loam
Subsoil:
7 to 12 inches—dark brown loam and fine sandy loam
12 to 15 inches—brown, mottled fine sandy loam
15 to 20 inches—reddish brown, mottled fine sandy loam and loamy fine sand
20 to 28 inches—reddish brown, mottled gravelly fine sandy loam
Bedrock:
28 inches—grayish brown dolomitic sandstone

Soil Properties and Qualities

Depth class: Shoepac—very deep; Reade—moderately deep to dolomitic sandstone
Permeability: Shoepac—moderate in the surface layer and subsoil and moderately slow in the substratum; Reade—moderate
Available water capacity: Shoepac—moderate; Reade—low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Shoepac soil and similar soils: 50 to 70 percent

Reade soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The poorly drained Ensley and Nahma soils in depressions and drainageways
- The well drained Trenary soils in the slightly higher landscape positions
- The somewhat poorly drained Charlevoix soils in the slightly lower landscape positions

Similar components:
- Reade soils that have bedrock at a depth of less than 20 inches
- Shoepac soils that are sand in the surface layer and subsurface layer and the upper part of the subsoil
- Shoepac soils that have a very firm subsoil and are very slowly permeable

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soils are relatively dry or have an adequate snow cover.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, depth to bedrock
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- In areas of the Reade soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock.

Septic tank absorption fields
Major management concerns: Seasonal wetness, depth to bedrock
Management considerations:
- In areas of the Shoepac soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
- Because of wetness and the depth to bedrock, the Reade soil is poorly suited to use as a site for septic tank absorption fields.

199—Udorthents, ash

Setting

Shape of areas: Irregular
Size of areas: 13 to 66 acres

Map Unit Composition

About 90 percent of this map unit consists of fly ash, which is a by-product of the two coal-burning electrical power plants in Marquette. These disposal sites have steep or very steep side slopes. Some areas of this map unit have been revegetated through reclamation efforts. Other areas are active disposal sites. About 10 percent of the map unit consists of made land surrounding the fly ash.

Use and Management

Land use: Fly ash disposal sites
Management considerations:
- Onsite investigation is needed to determine the suitability for specific uses.

200A—Charlevoix-Ensley complex, bedrock substratum, 0 to 3 percent slopes

Setting

Landform: Charlevoix—nearly level areas on upland plains; Ensley—depressions and drainageways on bedrock-controlled ground moraines
Shape of areas: Irregular
Size of areas: 5 to 600 acres

Typical Profile

Charlevoix
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 3 inches—very dark gray silt loam
Subsurface layer:
3 to 8 inches—brown, mottled silt loam
Subsoil:
8 to 12 inches—brown, mottled silt loam
12 to 28 inches—reddish brown, mottled fine sandy loam
Substratum:
28 to 70 inches—reddish brown, mottled cobbly fine sandy loam
Bedrock:
70 inches—pale olive limestone

Ensley
Surface layer:
0 to 5 inches—black muck
Subsurface layer:
5 to 6 inches—black mucky fine sandy loam
6 to 10 inches—brown, mottled fine sandy loam
Subsoil:
10 to 19 inches—brown, mottled fine sandy loam
Substratum:
19 to 70 inches—reddish brown gravelly fine sandy loam
Bedrock:
70 inches—pale olive limestone

Soil Properties and Qualities

Depth class: Very deep to limestone bedrock
Permeability: Moderate

Available water capacity: Moderate
Drainage class: Charlevoix—somewhat poorly drained; Ensley—poorly drained
Surface runoff class: Charlevoix—very slow; Ensley—very slow or ponded
Flooding: None
Content of organic matter: Charlevoix—low; Ensley—moderate
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Charlevoix soil and similar soils: 50 to 70 percent
Ensley soil and similar soils: 20 to 40 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The very poorly drained Cathro soils in landscape positions similar to those of the Ensley soil
- The somewhat poorly drained Sundell soils in landscape positions similar to those of the Charlevoix soil
- The moderately well drained Reade and Shoepac soils in the slightly higher landscape positions

Similar components:
- Charlevoix soils that have a substratum of stratified sand and gravel
- Charlevoix soils that are sand in the surface layer and subsurface layer and in the upper part of the subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- The seasonal high water table restricts the use of equipment to midsummer, when the soils are dry, or midwinter, when there is an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Trees that can withstand seasonal wetness should be selected for planting on the Charlevoix soil.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Ensley soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, ponding
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Charlevoix soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because of ponding, the Ensley soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Seasonal wetness, ponding
Management considerations:
- Filling or mounding with suitable material helps to raise the absorption field above the water table in areas of the Charlevoix soil.
- Because of ponding, the Ensley soil is generally unsuited to use as a site for septic tank absorption fields.

201B—Sauxhead-Jacobsville complex, 0 to 6 percent slopes, very stony

Setting

Landform: Sauxhead—undulating areas on sandstone benches; Jacobsville—nearly level areas in depressions and drainageways on sandstone benches
Shape of areas: Irregular
Size of areas: 20 to 300 acres

Typical Profile

Sauxhead
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—dark reddish gray sandy loam
Subsoil:
4 to 14 inches—reddish brown very channery loamy sand
Bedrock:
14 to 17 inches—dark reddish brown, highly weathered and fractured sandstone
17 inches—reddish brown, mottled sandstone

Jacobsville
Surface layer:
0 to 4 inches—black muck
Subsurface layer:
4 to 9 inches—dark gray, mottled loam
Subsoil:
9 to 16 inches—reddish brown, mottled sandy loam
Substratum:
16 to 28 inches—reddish brown, mottled sandy loam
Bedrock:
28 inches—reddish brown sandstone

Soil Properties and Qualities

Depth class: Sauxhead—shallow to sandstone; Jacobsville—moderately deep to sandstone
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Sauxhead—very rapid; Jacobsville—moderate
Available water capacity: Low
Drainage class: Sauxhead—moderately well drained; Jacobsville—poorly drained
Surface runoff class: Sauxhead—slow; Jacobsville—very slow or ponded
Flooding: None
Content of organic matter: Sauxhead—low; Jacobsville—moderate
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Sauxhead soil and similar soils: 60 to 80 percent
Jacobsville soil and similar soils: 15 to 30 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Buckroe soils in the slightly higher positions within areas of the Sauxhead soil
- The somewhat poorly drained Zeba soils in areas between the Sauxhead and Jacobsville soils
- The very poorly drained Skandia soils in landscape positions similar to those of the Jacobsville soil
- Small areas of rock outcrop

Similar components:
- Sauxhead soils that have bedrock at a depth of less than 10 inches or more than 20 inches
- Jacobsville soils that have sandy and gravelly layers in the subsoil
- Sauxhead soils that are very cobbly fine sandy loam in the surface layer and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Equipment can be used only during dry summer months and during periods in winter when the snow cover is adequate.
- Because of the content of channers and the shallow rooting depth, trees are generally not planted on the Sauxhead soil.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Jacobsville soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Seasonal wetness, ponding, depth to bedrock
Management considerations:
- Because of the depth to bedrock, seasonal wetness, and ponding, these soils are poorly suited to building site development.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, depth to bedrock, seasonal wetness, ponding
Management considerations:
- These soils are generally unsuited to use as sites for septic tank absorption fields. Installation is difficult, failure of the system is possible, and ground-water contamination is a concern.

202B—Sauxhead sandy loam, 1 to 6 percent slopes, very stony

Setting

Landform: Gently undulating areas on sandstone benches
Shape of areas: Irregular or elongated
Size of areas: 20 to 180 acres

Typical Profile

Sauxhead
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—dark reddish gray sandy loam
Subsoil:
4 to 14 inches—reddish brown very channery loamy sand
Bedrock:
14 to 17 inches—dark reddish brown, highly weathered and fractured sandstone
17 inches—reddish brown, mottled sandstone

Soil Properties and Qualities

Depth class: Shallow to sandstone
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Very rapid
Available water capacity: Low
Drainage class: Moderately well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Sauxhead soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Yellowdog soils in the slightly higher positions on the landscape
- The somewhat poorly drained Zeba and poorly drained Jacobsville soils in the slightly lower positions on the landscape
- Small areas of rock outcrop

Similar components:
- Soils that have bedrock at a depth of more than 20 inches or less than 10 inches
- Soils that are very cobbly fine sandy loam in the surface layer and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition

Management considerations:
- Equipment should be used only when the soil is relatively dry or has an adequate snow cover.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Because of the depth to bedrock and the content of channers, trees are generally not planted on this soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.

Building site development
Major management concerns: Seasonal wetness, depth to bedrock
Management considerations:
- Because of seasonal wetness and the depth to bedrock, this soil is poorly suited to building site development.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, depth to bedrock
Management considerations:
- Because of the poor filtering capacity, seasonal wetness, and the depth to bedrock, this soil is generally unsuited to use as a site for septic tank absorption fields.

203A—Au Gres-Deford complex, 0 to 3 percent slopes

Setting

Landform: Au Gres—nearly level areas on broad plains; Deford—depressions and drainageways on outwash plains
Shape of areas: Elongated or irregular
Size of areas: 10 to 115 acres

Typical Profile

Au Gres
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 8 inches—dark reddish gray sand
Subsoil:
8 to 13 inches—dark reddish brown, mottled sand
13 to 27 inches—yellowish red, mottled sand
Substratum:
27 to 80 inches—brown, mottled sand

Deford
Surface layer:
0 to 6 inches—black muck
Subsurface layer:
6 to 30 inches—grayish brown and brown, mottled sand
Substratum:
30 to 80 inches—very dark gray sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Rapid
Available water capacity: Low
Drainage class: Au Gres—somewhat poorly drained; Deford—poorly drained
Surface runoff class: Au Gres—very slow; Deford—very slow or ponded
Flooding: None
Content of organic matter: Au Gres—low; Deford—high
Hazard of water erosion: Slight
Hazard of soil blowing: Au Gres—severe; Deford—moderate

Map Unit Composition

Au Gres soil and similar soils: 50 to 70 percent
Deford soil and similar soils: 15 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The excessively drained Rubicon soils on knolls and low ridges
- The very poorly drained Tawas soils in landscape positions similar to those of the Deford soil
- The moderately well drained Croswell soils in the slightly higher positions on the landscape

Similar components:
- Au Gres soils that have a strongly cemented subsoil
- Deford soils that have a darker substratum
- Au Gres soils that have a loamy substratum

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Equipment can only be used in the dry summer months and during periods in winter when snow cover is adequate.
- Seedling survival rates can be increased in areas of the Au Gres soil by carefully planting vigorous nursery stock.
- Because of wetness, seedling mortality, and plant competition, trees are generally not planted on the Deford soil.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting and strip cutting.
- Carefully managed reforestation helps to control undesirable understory plants.

Building site development
Major management concerns: Cutbanks caving, seasonal wetness, ponding
Management considerations:
- In areas of the Au Gres soil, cutbanks are not stable and are subject to caving. Trench walls should be reinforced.
- In areas of the Au Gres soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

• Because of ponding, the Deford soil is generally unsuited to building site development.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, ponding
Management considerations:
• The poor filtering capacity of the Au Gres soil can result in the pollution of ground water.
• In areas of the Au Gres soil, filling or mounding with suitable material helps to raise the absorption field above the water table.
• Because of ponding, the Deford soil is generally unsuited to use as a site for septic tank absorption fields.

204B—Gogebic-Tula complex, 1 to 6 percent slopes, very stony

Setting

Landform: Gogebic—gently undulating areas on knolls on bedrock-controlled moraines; Tula—nearly level areas in depressions on bedrock-controlled moraines
Shape of areas: Irregular
Size of areas: 30 to 200 acres

Typical Profile

Gogebic
Organic mat:
0 to 1 inch—black, partially decomposed forest litter
Surface layer:
1 to 3 inches—black cobbly silt loam
Subsurface layer:
3 to 5 inches—reddish gray cobbly silt loam
Subsoil:
5 to 13 inches—dark reddish brown cobbly fine sandy loam
13 to 18 inches—reddish brown cobbly sandy loam
18 to 62 inches—reddish brown, very firm very gravelly sandy loam and very gravelly loamy sand
Substratum:
62 to 80 inches—reddish brown very gravelly sandy loam

Tula
Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 5 inches—dark reddish gray cobbly very fine sandy loam
Subsurface layer:
5 to 8 inches—gray, mottled cobbly very fine sandy loam
Subsoil:
8 to 20 inches—reddish brown, mottled cobbly very fine sandy loam
20 to 28 inches—dark reddish brown gravelly sandy loam
28 to 37 inches—light reddish brown and reddish brown, mottled, very firm gravelly sandy loam
37 to 62 inches—dark reddish brown and reddish brown, very firm gravelly sandy loam and gravelly loam
Substratum:
62 to 80 inches—reddish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Rock fragments on the surface: Stones spaced approximately 3 to 25 feet apart
Permeability: Moderate in the surface layer and subsurface layer and the upper part of the subsoil, very slow in the lower part of the subsoil, and moderate in the substratum
Available water capacity: Gogebic—low; Tula—moderate
Drainage class: Gogebic—moderately well drained; Tula—somewhat poorly drained
Surface runoff class: Gogebic—slow; Tula—very slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Slight
Hazard of soil blowing: Moderate

Map Unit Composition

Gogebic soil and similar soils: 60 to 80 percent
Tula soil and similar soils: 15 to 35 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Schweitzer soils in the higher positions on the landscape
- The poorly drained Pleine soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of 40 to 80 inches
- Soils that have a substratum of sand or gravelly sand
- Tula soils that are sand in the surface layer, subsurface layer, and subsoil

Use and Management

Woodland
Major management concerns: Equipment limitations, seedling mortality, windthrow hazard, plant competition
Management considerations:
- Skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system.
- Equipment should be used only when the soils are relatively dry or have an adequate snow cover.
- Large stones on the surface can hinder harvesting operations and damage equipment.
- Trees that can withstand seasonal wetness should be selected for planting.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced and by such harvest methods as selective cutting.
- If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Subsequent control of the invasion and growth of hardwoods may be needed.

Building site development
Major management concerns: Seasonal wetness, cutbanks caving
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.
- Because cutbanks are unstable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Restricted permeability, seasonal wetness
Management considerations:
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability.
- Filling or mounding with suitable material helps to raise the absorption field above the water table.

206B—Traunik gravelly fine sandy loam, 1 to 6 percent slopes

Setting

Landform: Gently undulating outwash terraces on ground moraines
Shape of areas: Irregular
Size of areas: 5 to 55 acres

Typical Profile

Organic mat:
0 to 1 inch—black, well decomposed forest litter
Surface layer:
1 to 4 inches—brown gravelly fine sandy loam
Subsoil:
4 to 11 inches—dark brown gravelly fine sandy loam
11 to 24 inches—brown very gravelly sand
24 to 31 inches—dark yellowish brown very gravelly sand
Substratum:
31 to 80 inches—pale brown very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Moderate in the surface layer and the upper part of the subsoil and very rapid in the lower part of the subsoil and in the substratum
Available water capacity: Low
Drainage class: Well drained
Surface runoff class: Slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight; on roads and trails—moderate
Hazard of soil blowing: Moderate

Map Unit Composition

Traunik soil and similar soils: 85 to 90 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Trenary soils in landscape positions similar to those of the Traunik soil
- The moderately well drained Northland soils in areas that have slopes of less than 4 percent
- The somewhat poorly drained Charlevoix soils and the poorly drained Ensley and Minocqua soils in depressions and drainageways

Similar components:
- Soils that have loamy textures in the substratum
- Soils that have less gravel throughout

Use and Management

Woodland
Major management concerns: Erosion hazard
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.

Building site development
Major management concerns: Cutbanks caving
Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.

Septic tank absorption fields
Major management concerns: Poor filtering capacity
Management considerations:
- The poor filtering capacity of this soil can result in the pollution of ground water.

207D—Dishno-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery

Setting

Landform: Gently rolling and rolling areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 10 to 500 acres

Typical Profile

Dishno
Organic mat:
0 to 1 inch—dark reddish gray, partially decomposed forest litter
Surface layer:
1 to 3 inches—dark reddish brown cobbly silt loam
Subsurface layer:
3 to 9 inches—reddish gray cobbly silt loam
Subsoil:
9 to 18 inches—dark brown cobbly loam and cobbly fine sandy loam
18 to 22 inches—brown, firm cobbly loamy sand
22 to 29 inches—brown, mottled very stony loamy sand
Substratum:
29 to 46 inches—brown, mottled very stony loamy sand
Bedrock:
46 inches—gneiss

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam

Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Dishno—deep to igneous or metamorphic bedrock; Michigamme—moderately deep to igneous or metamorphic bedrock
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Dishno—moderate in the surface layer and the upper part of the subsoil and moderately rapid in the lower part of the subsoil and in the substratum; Michigamme—moderate
Available water capacity: Low
Drainage class: Dishno—moderately well drained; Michigamme—well drained
Surface runoff class: Dishno—slow; Michigamme—medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Off-road—slight in areas of the Dishno soil and moderate in areas of the Michigamme soil; on roads and trails—moderate in areas of the Dishno soil and severe in areas of the Michigamme soil
Hazard of soil blowing: Moderate

Map Unit Composition

Dishno soil and similar soils: 25 to 40 percent
Michigamme soil and similar soils: 20 to 40 percent
Rock outcrop: 10 to 35 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keewaydin and Schweitzer soils in landscape positions similar to those of the major soils
- The excessively drained Kalkaska soils in landscape positions similar to those of the major soils
- The poorly drained Witbeck and very poorly drained Tawas soils in depressions and drainageways

Similar components:
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, windthrow hazard, plant competition
Management considerations:
- The hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- Skidders should not be used during wet periods, when ruts form easily.

- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- The rock outcrop may interfere with the use of harvesting equipment and the placement of haul roads.
- Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope, depth to bedrock, seasonal wetness
Management considerations:
- Buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the bedrock and the water table.
- In areas where slopes are less than 15 percent, buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.
- Areas that have slopes of more than 15 percent are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Depth to bedrock, slope, seasonal wetness
Management considerations:
- This map unit is generally unsuited to use as a site for septic tank absorption fields because of the depth to bedrock. Inadequately treated sewage effluent flowing through crevices in the bedrock can pollute nearby ground-water supplies. Mounding with a suitable filtering material helps to overcome this limitation.
- In areas of the Dishno soil, filling or mounding with suitable material helps to raise the absorption field above the water table.

208F—Keewaydin-Michigamme cobbly fine sandy loams, 18 to 45 percent slopes, rocky, very bouldery

Setting

Landform: Very hilly areas on bedrock-controlled moraines
Distinctive landscape features: Igneous and metamorphic rock outcrops
Shape of areas: Irregular
Size of areas: 5 to 450 acres

Typical Profile

Keewaydin
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 4 inches—reddish brown cobbly fine sandy loam
Subsoil:
4 to 10 inches—dark reddish brown fine sandy loam
10 to 20 inches—strong brown cobbly fine sandy loam
20 to 31 inches—brown gravelly loamy sand
Substratum:
31 to 80 inches—brown very cobbly loamy sand

Michigamme
Organic mat:
0 to 2 inches—black, well decomposed forest litter
Surface layer:
2 to 5 inches—dark reddish gray cobbly fine sandy loam
Subsoil:
5 to 24 inches—dark reddish brown cobbly fine sandy loam
24 to 29 inches—reddish brown cobbly fine sandy loam
Bedrock:
29 inches—gneiss

Soil Properties and Qualities

Depth class: Keewaydin—very deep; Michigamme—moderately deep
Rock fragments on the surface: Boulders spaced approximately 10 to 65 feet apart
Permeability: Keewaydin—moderate in the surface layer and the upper part of the subsoil and moderately rapid or rapid in the lower part of the subsoil and in the substratum; Michigamme—moderate
Available water capacity: Keewaydin—moderate; Michigamme—low
Drainage class: Well drained
Surface runoff class: Medium
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Severe
Hazard of soil blowing: Moderate

Map Unit Composition

Keewaydin soil and similar soils: 45 to 60 percent
Michigamme soil and similar soils: 25 to 40 percent
Rock outcrop: 0.1 to 10 percent
Dissimilar components: 10 to 15 percent

Components of Minor Extent

Dissimilar components:
- The well drained Keweenaw soils in landscape positions similar to those of the major soils
- The moderately well drained Champion soils in areas that have slopes of less than 18 percent
- The poorly drained Witbeck and very poorly drained Cathro soils in depressions and drainageways

Similar components:
- Soils that have a substratum of stratified sand and gravel
- Soils in areas where the surface boulders are 1 to 3 feet apart
- Soils that have bedrock at a depth of less than 20 inches

Use and Management

Woodland
Major management concerns: Erosion hazard, equipment limitations, plant competition
Management considerations:
- Because of the erosion hazard, water should be removed by water bars, out-sloping or in-sloping road surfaces, culverts, and drop structures. Building logging roads on the contour or on the gentler slopes and seeding logging roads, skid roads, and landings after the trees are logged also help to prevent excessive soil loss.

- Because of the slope, special care is needed in laying out logging roads and landings and in operating logging equipment. Logging roads should be designed so that they conform to the topography.
- Skidders should not be used during wet periods, when ruts form easily.
- Year-round logging roads require roadfill and gravel. Culverts are needed to maintain the natural drainage system.
- Because of stones and boulders on the surface, wheeled skidders with high clearance should be operated at a reduced speed over carefully chosen routes.
- Small areas of nearly level included soils, if any are available, or suitable nearly level adjacent areas should be selected as sites for landings.
- After cutting, competition from brush can delay or prevent natural regeneration of desired species.
- Special harvest methods may be needed to control undesirable plants.

Building site development
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are poorly suited to building site development unless extensive land shaping is applied.

Septic tank absorption fields
Major management concerns: Slope
Management considerations:
- Because of the slope, these soils are generally unsuited to use as sites for septic tank absorption fields.

209B—Garlic-Fence complex, 1 to 6 percent slopes

Setting

Landform: Gently undulating areas on till-floored lake plains
Shape of areas: Irregular or elongated
Size of areas: 5 to 200 acres

Typical Profile

Garlic
Organic mat:
0 to 1 inch—black, well decomposed leaf litter
Surface layer:
1 to 9 inches—reddish gray fine sand
Subsoil:
9 to 15 inches—dark reddish brown, moderately cemented fine sand
15 to 26 inches—dark reddish brown, strongly cemented fine sand
26 to 46 inches—brown fine sand
Substratum:
46 to 80 inches—brown fine sand

Fence
Surface layer:
0 to 3 inches—very dark gray very fine sandy loam
Subsurface layer:
3 to 7 inches—reddish gray very fine sandy loam
Subsoil:
7 to 16 inches—dark reddish brown and reddish brown very fine sandy loam
16 to 19 inches—yellowish brown loamy very fine sand

19 to 42 inches—reddish brown and red, mottled silt loam and reddish brown very fine sandy loam

Substratum:

42 to 57 inches—stratified, reddish brown, mottled silt loam and very fine sandy loam and red silty clay loam

57 to 80 inches—stratified, reddish brown, mottled silt loam and brown very fine sand

Soil Properties and Qualities

Depth class: Very deep
Permeability: Garlic—rapid; Fence—moderately slow
Available water capacity: Garlic—low; Fence—high
Drainage class: Garlic—well drained; Fence—moderately well drained
Surface runoff class: Garlic—very slow; Fence—slow
Flooding: None
Content of organic matter: Low
Hazard of water erosion: Garlic—slight; Fence—moderate
Hazard of soil blowing: Garlic—severe; Fence—moderate

Map Unit Composition

Garlic soil and similar soils: 60 to 80 percent
Fence soil and similar soils: 15 to 25 percent
Dissimilar components: 5 to 15 percent

Components of Minor Extent

Dissimilar components:
- The moderately well drained Paquin soils in areas that have slopes of less than 4 percent
- The somewhat poorly drained Au Gres and poorly drained Deford soils in depressions and drainageways

Similar components:
- Fence soils that are sand in the surface layer and subsurface layer and the upper part of the subsoil
- Garlic soils that are gravelly sand in the lower part of the subsoil and in the substratum

Use and Management

Woodland

Major management concerns: Erosion hazard, equipment limitations, seedling mortality, plant competition

Management considerations:
- In areas of the Fence soil, the hazard of erosion can be reduced by seeding logging roads, landings, and areas that have been cut and filled and by installing water bars and culverts.
- In areas of the Garlic soil, loose sand can interfere with the traction of wheeled equipment. Logging roads should be stabilized.
- In areas of the Fence soil, skidders should not be used during wet periods, when ruts form easily. Year-round logging roads require a gravel base.
- In areas of the Garlic soil, planting special nursery stock or containerized seedlings can reduce the seedling mortality rate.
- Special harvest methods may be needed to control undesirable plants.

Building site development

Major management concerns: Cutbanks caving, seasonal wetness

Management considerations:
- Because cutbanks are not stable and are subject to caving, trench walls should be reinforced.
- In areas of the Fence soil, buildings can be constructed on well compacted fill material, which raises the site a sufficient distance above the water table.

Septic tank absorption fields
Major management concerns: Poor filtering capacity, seasonal wetness, restricted permeability
Management considerations:
- The poor filtering capacity of the Garlic soil can result in the pollution of ground water.
- In areas of the Fence soil, mounding or adding suitable fill material helps to raise the absorption field above the water table.
- Enlarging or pressurizing the absorption field or installing alternating drain fields helps to overcome the restricted permeability in areas of the Fence soil.

M-W—Miscellaneous water

General Definition

- This map unit consists of manmade areas that are used for industrial, sanitary, or mining applications and that contain water most of the year.

W—Water

General Definition

- This map unit consists of naturally occurring bodies of water, such as rivers, streams, lakes, reservoirs, and ponds.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

General management concerns affecting crops and pasture are described in this section. The crops and pasture plants commonly grown in the survey area, including some that are not commonly grown but that are suitable for cultivation, are identified. The estimated yields of the main crops and hay and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1988, approximately 24,484 acres in the survey area was used for crops and pasture. About 4,679 acres was used for forage crops, 120 acres for corn, and 750 acres for small grain crops. The rest of the acreage was used for specialty crops or pasture (Michigan Department of Agriculture, 1988).

Field crops commonly grown in the county include alfalfa, barley, oats, potatoes (fig. 15), corn, birdsfoot trefoil, red clover, alfalfa, bromegrass, and timothy. Small acreages of cabbage and other such crops are grown for wildlife feed.

Figure 15.—Potatoes in an area of Emmet fine sandy loam, 1 to 6 percent slopes. Removing stones or cobbles can facilitate the harvesting of this crop.

The annual number of frost-free days ranges from about 140 along Lake Superior to 70 at the higher elevations away from Lake Superior (Michigan State University, 1965). The crops selected should be those that are adapted to a short, cool growing season and strongly acidic soils, which are typical in Marquette County. Crops that have potential for local and specialized markets include cabbage, broccoli, peas, spinach, cranberries, raspberries, blackberries, and blueberries.

Crop production can be enhanced by carefully selecting crop varieties and by choosing growing sites that take advantage of soil conditions, such as water-holding capacity, drainage, maximum sun exposure, southern aspect, and cold air drainage.

The general soil map is useful for locating certain types of soils the county. Soil type is one of the most important factors in determining the productivity for any given crop. The general soil map can provide an understanding of the composition and relationships of soils and landforms in the county.

Crop production in the county could be increased by utilizing the best technology and conservation practices on suitable soils in the county. This soil survey can help to facilitate these efforts.

Some of the major management concerns affecting crop production in the county are acid soils, low fertility levels, the hazard of erosion, soil wetness, droughtiness, rock fragments, frost hazard, tilth, and the short, cool growing season.

Many soils in Marquette County are acidic and low in natural fertility. Applications of lime in conjunction with a well managed fertilizer program can help to overcome these problems. On all soils, the amount of lime and fertilizer to be applied should be based on the results of laboratory soils tests. The Cooperative Extension Service can help to

determine the amounts of fertilizer and lime needed by different crops for the desired yields (Michigan State University, 1985).

Soil erosion by water or wind results when the soil surface is left unprotected. Vegetation and crop residue protect the soil from erosion by intercepting the force of wind and rain, which can detach small soil particles and convey them away.

Erosion is damaging for several reasons. Topsoil lost by erosion is generally the most fertile part of the soil. As the soil erodes, productivity decreases, plants become stunted, and seedling mortality increases. Also, the soil commonly becomes less resistant to further erosion. Sediment from erosion clogs culverts and drainage ditches and can destroy fish habitat by silting in stream spawning grounds. Sediments from cropland entering creeks and lakes can contain fertilizer and pesticides, which can further reduce water quality and alter the aquatic habitat.

The erodibility of a soil is dependent upon the texture of the surface layer, the length of the slope, and the slope gradient. Generally, as the slope increases, the hazard of erosion by water also increases. Soils that have clayey, silty, or loamy textures are more prone to water erosion than sandy soils. In Marquette County the soils most susceptible to water erosion are Fence silt loam, Frohling fine sandy loam, Munising fine sandy loam, Onaway fine sandy loam, Emmet fine sandy loam, and Shoepac silt loam.

Conservation practices for erosion control provide a protective surface cover, reduce the runoff rate, and increase the rate of water infiltration and thus reduce the amount of sediment that enters and clogs waterways. Some examples of erosion-control conservation practices that are commonly used are briefly described in the following paragraphs.

Conservation tillage or minimum tillage systems apply minimal cultivation so that a sufficient cover of crop residue is left on the soil surface to prevent wind erosion. Such tillage systems include a crop rotation schedule that promotes an ideal amount of topsoil.

Crop residue management programs maintain and enhance topsoil by selecting species, varieties, and fertilizers that produce a certain amount of crop residue. For example, grasses and grains produce more residue than legumes.

Green manure crops are grown explicitly for the purpose of enhancing topsoil fertility and organic matter content. They are incorporated into the soil while they are still green. Rye grass and red clover are commonly used as green manure crops. Any crop that is easily established, grows rapidly, and is easily eradicated may be used as green manure. Planting legumes in conjunction with the green manure crop can add nitrogen to the soil, thus reducing the need for nitrogen fertilizer.

Cover crops are seeded during final cultivation of a crop. When the main crop is harvested, the cover crop then serves as winter cover for erosion control, and it retains nutrients that otherwise might be leached downward into the soil. The growth period of the proposed cover crop should be long enough for the cover crop to reach maturity after the cash crop is removed.

Applications of animal manure can enhance topsoil, organic matter content, and fertility. It is important to prevent the contamination of surface water, which can result from applying excessive amounts of agricultural waste on land that slopes towards streams. Excessive application rates can also cause ground-water contamination.

Contour stripcropping is a technique whereby strips of row crops are alternated with strips of grass-legume hay or small grain crops on the contour or perpendicular to the prevailing winds.

Grassed waterways are used to prevent the formation of gullies in areas where water is transported down a slope in a concentrated flow. Subsurface drainage tile can be installed beneath the waterway to remove excess water. This internal drainage enhances vegetative growth in the waterway and provides drier conditions for crossing

with equipment during field operations. Rocked crossings can also be built across waterways to provide safe access to various fields.

Soil blowing, or wind erosion, can be a hazard on all unprotected soils. It is especially a concern in areas of soils that have a sandy surface layer, such as Au Gres, Croswell, Finch, Kalkaska, Liminga, Paquin, Rubicon, and Yalmer soils. Drained and unprotected organic soils are likewise highly susceptible to wind erosion. Maintaining a vegetative cover or surface mulch can reduce the hazard of wind erosion. Also, field windbreaks of adapted trees and shrubs planted at right angles to the prevailing winds can provide protection from wind erosion.

Soil drainage is a management concern in areas that are excessively wet. The wetness can result from a high water table caused by snowmelt or rain; shallow depth to bedrock; floodwater; or position on the landscape. These wet soils are generally in low-lying areas and depressions. Equipment operations, seed germination, and plant growth can be adversely affected unless the excess water is removed. Soils that have a high water table are also subject to low soil temperature and frost hazard, which can also hinder production.

Very poorly drained and poorly drained soils have a water table near or above the surface for most of the year. Crop production is typically not feasible in areas of these soils. Very poorly drained soils in Marquette County include Carbondale, Cathro, Dawson, Greenwood, Jacobsville, Skandia, and Tawas soils. These soils have thick accumulations of organic material and in undrained areas exhibit obvious wetland characteristics. Poorly drained soils include Burt, Ensley, Evart, Gay, Kinross, Minocqua, Nahma, Pleine, Deford, Shag, and Witbeck soils.

Somewhat poorly drained soils have a water table within a depth of 6 inches during excessively wet periods. Au Gres, Channing, Charlevoix, Net, Skanee, and Solona soils are examples.

Moderately well drained soils have a water table within a depth of 24 inches during excessively wet periods. These include Champion, Croswell, Fence, Gogebic, Munising, and Yalmer soils. Many of these soils have a restrictive layer with restricted permeability at a depth of about 24 inches. Small areas of wetter soils are commonly included with these soils in mapping.

The design of surface and subsurface drainage systems varies with the kind of soil. Because of the frost hazard in areas of poorly drained and very poorly drained soils, most drainage improvements have been implemented in somewhat poorly drained and moderately well drained areas. Surface drainage systems are commonly the most cost effective. Improving natural waterways, removing drainage obstructions, and establishing diversions that redirect surface runoff can help to overcome drainage problems. Deeper drainage ditches may be useful if an adequate outlet exists. Subsurface tile drainage systems can also be used for lowering a water table; however, many local soils have a fragipan, which may interfere with the functioning of tile drainage. Information about the design of drainage systems is available in local offices of the Natural Resources Conservation Service and Conservation Districts.

Soil droughtiness is a management concern affecting crop production. Sandy soils have a low available water capacity, and crops may wither during the summer unless they are irrigated or are drought resistant. Examples of droughty soils in Marquette County are Croswell, Kalkaska, Mancelona, Rubicon, Sayner, Waiska, and Yalmer soils. The soil moisture-holding capacity can be improved in areas of these soils by increasing the content of organic matter or by adding finer textured soil material or humus.

Rock fragments are a management concern because they interfere with the use of tillage, planting, and harvesting equipment. Removing the rock fragments can reduce equipment wear and may increase yields. In many areas in Marquette County, however, the soils contain such large amounts of rock fragments that growing crops is impractical. Gogebic, Keewaydin, Schweitzer, and Vanriper soils are examples.

Frost can injure sensitive crops. Spring, fall, and occasional summer frosts occur as freezing air from higher altitudes falls because it is heavier than the lower warm air. The coldest air travels downslope to the lowest areas and accumulates, causing frost in lowlands and creek beds and on flood plains.

The short, cool growing season in the survey area limits the growth and maturation of crops. Cold soils inhibit seed germination. The direction that the land slopes, called slope aspect, has an important effect on soil temperature and on crop growth. Areas with a southern aspect warm up considerably faster in the spring than other areas. Crops germinate and grow faster because of increased sunlight and soil temperatures. On the other hand, south-facing slopes also lose soil moisture and become droughty earlier than other areas during the drier years. The effects of early germination and growth can be deleterious to frost-sensitive plants.

Soil tilth is an important factor affecting the germination and subsequent growth of seeds, the hazard of erosion, the runoff rate, the rate of water infiltration, and the amount of water available to crops. Soils with good tilth are granular and porous. In areas where the soils have poor tilth, a crust can form on the surface after intense rainfall. Soils that have a loamy surface layer can have poor tilth if organic matter is not continually added. No-till pasture and hayland seeding can maintain good soil tilth and conserve existing soil moisture.

Soil compaction occurs when machinery is used in areas of wet, loamy soils or if heavy animals are allowed to graze in these areas. Productivity is reduced in areas of compacted soils because the increased soil density inhibits root penetration. Also, the reduction of soil pore space in the root zone restricts the air and water available to roots.

Pasture management includes proper fertilization and liming according to laboratory tests. Strategic pasture rotation, deferred grazing, adequate water supplies for livestock, and the maintenance of the key forage species also are factors in pasture management. Key forage species include birdsfoot trefoil and bromegrass on medium textured, moderately well drained soils; alfalfa, red clover, bromegrass, and orchardgrass on medium textured, well drained soils; and birdsfoot trefoil and reed canarygrass on wet soils. Alfalfa grows best in soils that are near neutral, such as Onaway and Emmet soils. For legumes in all pasture mixes, the proper type and quantity of inoculant should be applied at planting so that the nitrogen-forming bacteria can form root nodules.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, woodland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, woodland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, woodland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, or wildlife habitat.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of map units in this survey area is given in the yields table. It is also given under the heading "Interpretive Groups."

Also under the heading "Interpretive Groups," the Michigan soil management group is listed. The soils in each map unit are assigned to a group according to the dominant texture, the drainage class, and the major management concerns (Mokma and others, 1978). More detailed information about these groups is available from the local office of the Michigan State University Cooperative Extension Service.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 66,525 acres in the survey area, or nearly 6 percent of the total acreage, meets the soil requirements for prime farmland. Most of the prime farmland is in the southern part of the county and is used as woodland.

The map units in the survey area that are considered prime farmland are listed in table 7. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Woodland Management and Productivity

This section describes the major concerns associated with the use and management of woodland. It also provides information about the major forest habitat types and their relationship to the different kinds of soils in the survey area.

Woodland makes up about 967,000 acres in the survey area, or about 83 percent of the total acreage. Federal and State agencies control about 235,000 acres. Forest industry companies and other corporations own and manage about 433,500 acres of privately owned woodland in the county. Private, nonindustrial woodland accounts for about 257,200 acres.

Woodland is the dominant land use on most of the soils in the county. Upland soils dominantly support northern hardwoods, consisting of sugar maple, red maple, basswood, yellow birch, and hemlock. Black cherry, balsam fir, and white spruce also are in some stands. Young, even-aged stands are mostly aspen-birch. Large areas support aspen or mixed northern hardwoods and aspen. Stands on the wetter soils are predominantly red maple, quaking aspen, black ash, paper birch, and balsam fir. Jack pine, red pine, and white pine are common on sandy soils. Large areas of recently cut and/or burned woodland support aspen, aspen-birch, mixed northern hardwoods and aspen, or jack pine on sandy soils. Stands on the wetter upland soils are dominantly red maple, quaking aspen, paper birch, white spruce, and balsam fir.

Wooded swamps support mostly balsam fir, black spruce, northern whitecedar, and tamarack. Red maple, quaking aspen, paper birch, and black ash are in some stands.

Composition of woodland by forest type in 1980 was 8 percent pine, 25 percent spruce-fir and other conifers, 4 percent elm-ash and other lowland hardwoods, 44 percent maple-basswood-birch and other upland hardwoods, 18 percent aspen-birch, and 0.5 percent nonstocked areas. Composition of woodland by stand size in 1980 was 38 percent sawtimber, 45 percent poletimber, 17 percent sapling and seedling stands, and 0.5 percent nonstocked areas.

The total area of standing commercial forest is about 66 percent hardwoods and 33 percent softwoods. The net volume of growing stock on commercial forest land is about 63 percent hardwoods and 37 percent softwoods. About 22 percent of the volume of growing stock in an eight-county area of the western Upper Peninsula is in Marquette County.

In 1980, growing stock had a volume of 1,264,465,000 cubic feet, an annual growth of 43,818,000 cubic feet, and an annual removal of 16,525,000 cubic feet. Sawtimber had a volume of 3,406,308,000 board feet, an annual growth of 151,347,000 board feet, and an annual removal of 50,123,000 board feet.

The forest products industry is an important employer in Marquette County. The harvest, transportation, and processing of wood are important parts of the economy. Productive soils, a good transportation system, proximity to wood-processing industries, and a large volume of growing stock ensure the future economic potential for the forest products industry in Marquette County.

Pulpwood and sawlogs used for lumber are the major wood products in the county (fig. 16). Some logs for veneer also are harvested. The majority of the wood harvested is transported outside the county for processing at paper mills, sawmills, veneer plants, and furniture factories. There are several small sawmills in the county that process sawlogs for lumber. Portable sawmills are occasionally used to process logs into lumber at the logging site. A few local small businesses manufacture furniture from higher grade lumber. Other important woodland products are firewood, poles and posts, and maple syrup. Minor woodland products produced in the county include Christmas trees, pallets, stakes, signs, and wood paneling.

Soil erosion can occur as a result of site preparation and cutting if the soil is exposed along logging roads. Burned areas also are susceptible to erosion. Soil erosion is generally a hazard on woodland if the slope is 15 percent or more. About 285,000 acres of woodland soils in the survey area are susceptible to erosion, including some of the Onaway, Frohling, and Schweitzer soils. Building logging roads and skid roads on the contour can help to control erosion.

Soil wetness is the result of a high water table, flooding, or ponding. Soil wetness causes seedling mortality, limits the use of equipment, increases the extent of

Figure 16.—Wood harvesting for pulpwood is the major land use in Marquette County.

undesirable plants following harvest, and increases the windthrow hazard by restricting the rooting depth of some trees.

Soils that have a perched water table make up approximately 92,000 acres in the survey area, or about 8 percent of the total acreage. They include the moderately well drained Munising, Paavola, and Gogebic soils and the somewhat poorly drained Skanee and Net soils. Ruts form easily if wheeled skidders are used when these soils are wet (fig. 17). Deep ruts tend to restrict lateral drainage, damage tree roots, and alter soil structure. Deep rutting can result in a change in species composition and can reduce yields. Soil wetness also is a problem on about 229,000 acres of poorly drained or very poorly drained soils in forested areas. Examples are Gay, Ensley, and Carbondale soils. In areas where wetness is a concern, equipment should be used only during dry periods or when the ground is frozen or has adequate snow cover.

Soil droughtiness can cause seedling mortality. Steep south- and west-facing slopes may be especially droughty because of high temperatures and evaporation. Droughtiness is a problem on about 125,000 acres of forested soils, such as Grayling, Kalkaska, and Rubicon soils. Slopes are steep on about 6 percent of this acreage. Planting when the soils are moist can help to minimize seedling mortality. Seedling survival during dry seasons can be improved by planting large, vigorous nursery stock if natural regeneration is undesirable or insufficient. Special site preparation, such as furrowing to conserve moisture, may also be needed. It may be necessary to use containerized planting stock on very dry sites.

Slope, stoniness, and *rock outcrops* can limit the use of forestry equipment. About 250,000 acres in the survey area has slopes of 15 percent or more. The slope limits

Figure 17.—Wetness and stones and boulders on the surface are characteristic of many of the soils in the survey area.

the use of equipment in logging areas and on skid roads and logging roads. Building logging roads and skid roads on the contour can help to overcome this limitation. On very steep slopes, track type harvesting equipment cannot be operated safely. Special systems are needed. The slope also affects the selection of sites for landings and log-handling areas. Level to undulating areas are the best sites. Stones, rock outcrops, and a shallow depth to bedrock not only restrict the use of equipment but also hinder the construction of logging roads. Stoniness is a problem on about 306,000 acres of forest land in the survey area, and rock outcrop is a problem on about 150,000 acres. Soils that have bedrock within a depth of 20 inches make up about 25,000 acres. Careful planning of proposed logging roads is needed to overcome these limitations.

Soil productivity is high on a large majority of the woodland in the survey area. The soils with a high moisture content may have an abundance of undesirable plants when openings are made in the tree canopy. The resulting competition from undesirable plants may suppress or prevent natural or planted regeneration of the more desirable species. Competing vegetation can be controlled by application of suitable herbicides, by mechanical removal, or by use of a proper harvesting method.

Table 8 can help woodland owners or forest managers plan the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic

meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; *L*, low strength in the spring thaw period and during periods of high rainfall; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, L, and N.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed also are subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers (fig. 18). A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main

Figure 18.—Wetness and a restricted depth to bedrock can contribute to the windthrow hazard. Pictured is an area of Sundell loam, 0 to 3 percent slopes.

factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. The volume was determined using standard yield tables (USDA/NRCS, National Forestry Manual).

The species that is followed by an asterisk under *common trees* is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

Trees to manage are those that are suitable for commercial wood production.

Table 9 can be used by woodland owners or forest managers in planning the use of soils for wood crops. This table provides information about operating harvesting or thinning equipment in logging areas and on skid roads, log landings, and haul roads. Limitations are given for the most limiting season and for the preferred operating season. The *most limiting season* in this survey area generally is spring or late fall. In some areas, however, it is during dry periods in summer, when loose sand can limit trafficability on deep, well drained, sandy soils. The *preferred operating season* is the period when harvesting or thinning causes the least amount of soil damage. This period generally is when the soil is not too wet or when the ground is frozen or partly frozen or has adequate snow cover.

In the table, a rating of *slight* indicates that the use of conventional logging equipment is not restricted if normal logging methods are used. A rating of *moderate* indicates that the use of equipment is restricted because of one or more soil factors. If wetness is a limitation, high flotation equipment or special procedures may be needed to prevent the formation of ruts. A rating of *severe* indicates that the kind of equipment that can be used is seriously restricted.

Logging areas and skid roads include areas where some or all of the trees are being cut. Generally, equipment traffic is least intensive in the logging areas. Skid roads, which generally are within the logging area, are roads or trails over which the logs are dragged or hauled from the stump to a log landing.

Log landings are areas where logs are assembled for transportation. Wheeled equipment may be used more frequently in these areas than in any other areas affected by logging.

Haul roads are access roads leading from primary or surfaced roads to the logging areas. The roads serve as transportation routes for wheeled logging equipment and logging trucks. Generally, they are unpaved roads. Some are graveled.

Forest Habitat Types

The information in this section is derived from a field guide developed for the Upper Peninsula of Michigan and for northeast Wisconsin (Coffman and others, 1980). The system of habitat classification used in the guide is based on the concept that plants occur in predictable patterns or communities and that these communities reflect differences in site characteristics.

Besides identifying the various habitat types by means of vegetative keys, the guide also provides information about the different possible successional stages for most of the habitat types. The successional stages depend largely on how the forest has been disturbed. They include the succession after logging in the original climax stands, the succession after logging in second-growth stands, and the succession in stands that have been both logged and burned.

The guide gives the suggested forest management for each of the successional stages. This management includes methods of thinning and harvest, site preparation, and measures that improve regeneration of the stands. The potential productivity in terms of a site index and mean annual volume, in cubic feet per acre per year, is given for most of the habitat types. The development of the descriptive or interpretive information for some of the habitat types, however, is based on limited data and thus should be used with caution.

Habitat types have been determined for each map unit in the survey area, with the exception of miscellaneous areas, such as borrow pits. The primary habitat type is the one that is most common on the map unit. The secondary habitat type is less common. Habitat types are listed in table 10 and in the “Interpretive Groups” section.

The following paragraphs describe the habitat types in the survey area. They provide information about the potential climax species, some of the common understory species, and, if known, the potential productivity of the habitat type.

AOC—Acer-Osmorhiza-Caulophyllum habitat type. This habitat type has a potential climax overstory dominated by sugar maple. Other species include eastern hemlock and American basswood. American elm, white ash, and hophornbeam are in some areas. The dominant ground flora include spinulose shield fern, blue cohosh, sweet cicely, lady fern, smooth yellow violet, Canada white violet, and downy yellow violet. The potential productivity for northern hardwoods is high.

AQVac—Acer-Quercus-Vaccinium habitat type. This habitat type has a potential climax overstory dominated by red maple and northern red oak. Other species include eastern hemlock, eastern white pine, balsam fir, and white spruce. The dominant ground flora includes lowbush blueberry, Canada blueberry, bracken fern, wintergreen, bigleaf aster, and beaked hazelnut. The potential productivity is moderately low for northern hardwoods, moderate for aspen, and moderately high for red pine and jack pine.

ATD—Acer-Tsuga-Dryopteris habitat type. This habitat type has a potential climax overstory dominated by sugar maple. Other species include eastern hemlock and American basswood. Yellow birch, red maple, and American elm are in some areas. The dominant ground flora includes spinulose shield fern, rosy twistedstalk, hairy Solomon's seal, red elderberry, and wild lily-of-the-valley. The potential productivity is moderately high for northern hardwoods and high for aspen. The potential productivity for red pine plantations is high if plant competition is controlled.

ATD-CI—Acer-Tsuga-Dryopteris habitat type, Circaea-Impatiens phase. This habitat type has a potential climax overstory dominated by sugar maple. Other species include eastern hemlock and American basswood. Yellow birch, red maple, and American elm are in some areas. The dominant ground flora includes spinulose shield fern, rosy twistedstalk, hairy Solomon's seal, red elderberry, wild lily-of-the-valley, jewelweed, and dwarf enchanter's nightshade. The potential productivity is moderately high for northern hardwoods and high for aspen. The potential productivity for red pine plantations is high if plant competition is controlled.

ATD-D—Acer-Tsuga-Dryopteris habitat type, Dryopteris phase. This habitat type has a potential climax overstory dominated by sugar maple. Other species include eastern hemlock and American basswood. Yellow birch, red maple, and American elm are in some areas. The dominant ground flora includes spinulose shield fern, rosy twistedstalk, hairy Solomon's seal, red elderberry, and wild lily-of-the-valley. The potential productivity is moderately high for northern hardwoods and high for aspen. The potential productivity for red pine plantations is high if plant competition is controlled.

AVO—Acer-Viola-Osmorhiza habitat type. This habitat type has a potential climax overstory dominated by sugar maple. Other species include American basswood, white ash, yellow birch, hophornbeam, eastern hemlock, and American elm. The dominant ground flora includes Canada white violet, downy yellow violet, smooth yellow violet, sweet cicely, spinulose shield fern, lady fern, hairy Solomon's seal, and rosy twistedstalk. The potential productivity is high for northern hardwoods and aspen. It also is high for red pine plantations if plant competition is controlled.

AVO-A—Acer-Viola-Osmorhiza habitat type, Adiantum phase. This habitat type has a potential climax overstory dominated by sugar maple. Other species include American basswood, white ash, yellow birch, hophornbeam, eastern hemlock, and American elm. The dominant ground flora includes Canada white violet, downy yellow violet, smooth yellow violet, sweet cicely, spinulose shield fern, wild leek, maidenhair fern, lady fern, Solomon's seal, and rosy twistedstalk. The potential productivity is high for northern hardwoods and aspen. It also is high for red pine plantations if plant competition is controlled.

AVO-CI—Acer-Viola-Osmorhiza habitat type, Circaea-Impatiens phase. This habitat type has a potential climax overstory dominated by sugar maple. Other species include American basswood, white ash, yellow birch, hophornbeam, eastern hemlock, and American elm. The dominant ground flora includes Canada white violet, downy yellow violet, smooth yellow violet, sweet cicely, spinulose shield fern, lady fern, hairy Solomon's seal, rosy twistedstalk, jewelweed, and dwarf enchanter's nightshade. The potential productivity is high for northern hardwoods and aspen. It also is high for red pine plantations if plant competition is controlled.

FI—Fraxinus-Impatiens habitat type. This habitat type has a potential climax overstory dominated by white ash and red maple. Other species include sugar maple, black ash, and balsam fir. The dominant ground flora includes jewelweed, sedges, dwarf enchanter's nightshade, spinulose shield fern, lady fern, red elderberry, and field mint. The potential productivity for northern hardwoods is moderate.

FMC—Fraxinus-Mentha-Carex habitat type. This habitat type has a potential climax overstory dominated by black ash and American elm. Other species include red maple and balsam fir. The dominant ground flora includes sedges, field mint, speckled alder, and jewelweed.

FMC-C—Fraxinus-Mentha-Carex habitat type, Carex phase. This habitat type has a potential climax overstory dominated by black ash and American elm. Other species include balsam fir and red maple. The dominant ground flora includes sedges, field mint, speckled alder, and jewelweed. This phase is mostly limited to active flood plains where trees generally do not grow.

PCS—Picea-Chamaedaphne-Sphagnum habitat type. This habitat type has a potential climax overstory dominated by black spruce. Other species include tamarack and northern whitecedar. The dominant ground flora includes leatherleaf, bog rosemary, pale laurel, sphagnum mosses, Labrador tea, sedges, and Canada blueberry.

PO—Picea-Osmunda habitat type. This habitat type has a potential climax overstory dominated by black spruce and northern whitecedar. Other species include eastern hemlock and white pine. The dominant ground flora includes cinnamon fern, sphagnum mosses, sedges, marsh marigold, and goldthread.

PVC—Pinus-Vaccinium-Carex habitat type. This habitat type has a potential climax overstory dominated by jack pine. Other species include red pine, black spruce, and white pine. The dominant ground flora includes sedges, low sweet blueberry, sweetfern, mountain juneberry, wild lily-of-the-valley, and spinulose shield fern. Potential productivity is moderate for jack pine.

PVD—Pinus-Vaccinium-Deschampsia habitat type. This habitat type has a potential climax overstory dominated by jack pine. Other species include red pine and white pine. The dominant ground flora includes hairgrass, sedges, reindeer moss, blue cladonia, sweetfern, low sweet blueberry, bracken fern, and trailing arbutus. The potential productivity is moderately low for red pine and moderate for jack pine.

QAE—Quercus-Acer-Epigaea habitat type. This habitat type has a potential climax overstory dominated by red oak and red maple. Other species are white spruce and eastern white pine. The dominant ground flora includes bracken fern, trailing arbutus, wintergreen, lowbush blueberry, mosses, and Canada blueberry. The potential productivity is moderately low for aspen and moderate for red pine and jack pine.

TM—Tsuga-Maianthemum habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock, sugar maple, and red maple. Other species include yellow birch, white spruce, balsam fir, eastern white pine, northern red oak, northern whitecedar, and American basswood. The dominant ground flora includes wild lily-of-the-valley, bracken fern, sedges, American starflower, and wild sarsaparilla. The potential productivity is moderate for northern hardwoods, moderately high for aspen, and high for red pine and jack pine.

TMC—Tsuga-Maianthemum-Coptis habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes wild lily-of-the-valley, goldthread, yellow beadlily, bunchberry, American starflower, and spinulose shield fern. The potential productivity is moderate for northern hardwoods and aspen.

TMC-D—Tsuga-Maianthemum-Coptis habitat type, Dryopteris phase. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes wild lily-of-the-valley, goldthread, yellow beadlily, bunchberry, American starflower, spinulose shield fern, longbeech fern, oak fern, and hairy Solomon's seal. The potential productivity is moderate for northern hardwoods and aspen.

TMC-V—Tsuga-Maianthemum-Coptis habitat type, Vaccinium phase. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes wild lily-of-the-valley, goldthread, yellow beadlily, bunchberry, American starflower, Canada blueberry, lowbush blueberry, and spinulose shield fern. The potential productivity is moderate for northern hardwoods and aspen.

TMV—Tsuga-Maianthemum-Vaccinium habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Other species include sugar maple, eastern white pine, balsam fir, white spruce, and northern red oak. The dominant ground flora includes Canada blueberry, wild sarsaparilla, bracken fern, wild lily-of-the-valley, lowbush blueberry, yellow beadlily, and wood betony. The potential productivity is moderate for northern hardwoods, moderately high for aspen, and high for red pine and jack pine.

TTM—Tsuga-Thuja-Mitella habitat type. This habitat type has a potential climax overstory dominated by northern whitecedar. Other species include balsam fir and red maple. The dominant ground flora includes naked miterwort, sedges, wild lily-of-the-valley, American starflower, twinflower, and bunchberry.

TTP—Tsuga-Thuja-Petasites habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and northern whitecedar. Other species include balsam fir, red maple, and sugar maple. The dominant ground flora includes sweet coltsfoot, bigleaf aster, sedges, barren strawberry, northern dewberry, bunchberry, wild sarsaparilla, and black snakeroot. The potential productivity is moderately low for aspen.

TTS—Tsuga-Thuja-Sphagnum habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and northern whitecedar. Other species include balsam fir, black spruce, and red maple. The dominant ground flora includes sphagnum mosses, goldthread, bunchberry, sedges, wild lily-of-the-valley, American starflower, and wood sorrel.

Recreation

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the

season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields, dwellings without basements, and local roads and streets.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

This section was prepared by Lynn Sampson, biologist, Natural Resources Conservation Service.

Wildlife is a product of the land and depends upon the complex relationships of soil, water, and vegetation for its needs. Wildlife populations are in balance with essential habitat containing food, cover, and water. The habitat for wildlife in Marquette County is diverse and ranges from heavily wooded areas to open farmland. Marquette County has many streams, inland lakes, and diverse wetlands, all of which support many species of fish and other wildlife.

Before permanent settlement, such wildlife species as black bear, elk, moose, timber wolf, bobcat, lynx, fisher, pine marten, and mountain lion inhabited the survey area.

After logging and agricultural development occurred in the late 1800s, the species in the area were those adapted to second-growth forest, brushy edges, and agricultural areas. Populations of white-tailed deer, red fox, snowshoe hare, and raccoons increased.

The wooded areas in the county provide important habitat for white-tailed deer, ruffed grouse, and snowshoe hare. These areas also provide food and cover for black bear, raccoons, skunks, tree squirrels, thrushes, woodpeckers, and mice. Young stands of jack pine provide important nesting areas and brooding habitat for the Kirtland's warbler.

Woodchucks, white-tailed deer, red fox, gray fox, coyote, hawks, owls, and numerous songbirds inhabit the farmed areas and associated idle areas of grass and brush.

The wooded streams and diverse wetlands provide habitat for birds and mammals, such as blue herons, sandhill cranes, the common loon, Canadian geese, bald eagles, belted kingfishers, woodcock, marsh hawks, muskrats, otter, weasel, beaver, and mink. Various reptiles and amphibians also occur, including the snapping turtle, painted turtle, common toad, leopard frog, spring peeper, and spotted salamander. The streams and lakes support good populations of brook trout, sunfish, perch, largemouth bass, smallmouth bass, walleye, and northern pike. The rivers and streams are popular among fishermen for trout, salmon, smelt, and steelhead.

The plant and animal communities of Marquette County include many species recognized as rare, threatened, or endangered by the State of Michigan. Included are the common loon, bald eagle, peregrine falcon, Caspian tern, Kirtland's warbler, dwarf bilberry, small blue-eyed Mary, calypso, northern oak fern, narrow-leafed gentian, lake cress, round-leaved orchis, pearlwort, pine-drops, fragile prickly pear, northern reedgrass, Canada rice-grass, moor rush, big-leaf sandwort, black sedge, green spleenwort, Lake Huron tansy, blunt-lobed woodsia, northern woodsia, and Farwell's watermilfoil.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, rye, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bunchberry, jewelweed, sedges, asters, and goldthread.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, aspen, cherry, apple, dogwood, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Siberian crabapple, American cranberrybush, and silky dogwood.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, cattails, arrowhead, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodchuck, bluebirds, coyote, field sparrow, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include hawks, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, or other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a

cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil

properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

The table gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, rock fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit

revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavation and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones or have a water table at a depth of 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent; are wet; or have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an

improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1

through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical Properties

Table 18 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 18, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$- or $^{1}/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (Ksat) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (Ksat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 18 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook" (USDA/NRCS, National Soil Survey Handbook).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 19 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Water Features

Soil moisture status is an estimate of the fluctuating water content in a soil. It greatly influences vegetation type and plant growth; physical properties of soils, such as permeability, workability, strength, linear extensibility, and frost action; and chemical interactions and transport. Many other properties, qualities, and interpretations also are affected. Soil moisture status is important in the classification of soils, wetland, and habitat.

Table 20 gives estimates of soil moisture for each component of a map unit at various depths for every month of the year. The depths displayed are representative values that are indicative of conditions that occur most commonly. These representative values of dry, moist, and wet can vary greatly from month to month and from year to year. *Dry* indicates a moisture condition under which most plants (especially crops) cannot extract water for growth. *Moist* indicates a moisture condition under which soil water is most readily available for plant growth. *Wet* indicates a condition under which water will stand in an unlined hole or at least a condition under which the soil is too wet for the growth of most agricultural species. A moisture status of 4.0-6.7 (wet) indicates that most of the time the component is saturated at some depth between 4.0 feet and 6.7 feet during the month designated. In some years the soil may be saturated at a depth of less than 4.0 feet or more than 6.7 feet; however, field observations indicate that the soil will be saturated between these depths in most years. In the summer, the soil may show the effects of drying plus intermittent rains that result in a moist or wet layer over a dry layer that gets moist or wet again.

In table 20, *hydrologic soil groups* are groups of soils that, when saturated, have the same runoff potential under similar storm and ground cover conditions. The soil properties that affect the runoff potential are those that influence the minimum rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a zone in which the soil moisture status is wet, the infiltration rate, permeability after prolonged wetting, and the depth to a very slowly permeable horizon or horizons. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil horizons.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have a moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a horizon or horizons that impede the downward movement of water or soils that have a moderately fine or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clayey soils that have a high linear extensibility; soils that have a zone, high in the profile, in which the soil moisture status is wet on a permanent basis; soils that have a claypan or clay horizon or horizons at or near the surface; and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation.

Table 21 gives estimates of the frequency, duration, and depth of ponding for every month of the year. The depths displayed are representative values that are indicative of conditions that occur most of the time.

Ponding frequency is the number of times ponding occurs over a period of time. *None* indicates no reasonable possibility of ponding (the chance of ponding is nearly 0 percent in any year). *Rare* indicates that ponding is unlikely but possible under unusual weather conditions (the chance of ponding ranges from nearly 0 percent to 5 percent in any year, or ponding is likely 0 to 5 times in 100 years). *Occasional* indicates that ponding is expected infrequently under usual weather conditions (the chance of ponding ranges from 5 to 50 percent in any one year, or ponding is likely 5 to 50 times in 100 years). *Frequent* indicates that ponding is likely to occur under usual weather conditions (the chance of ponding is more than 50 percent in any year, or ponding is likely more than 50 times in 100 years).

Ponding duration is the average length of time of the ponding occurrence. It is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 to 30 days), and *very long* (more than 30 days).

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

Table 22 gives estimates of the frequency and duration of flooding for every month of the year. Flooding frequency is the annual probability of a flood event expressed as a class. *None* indicates no reasonable possibility of flooding (the chance of flooding is nearly 0 percent in any year, or flooding is likely less than once in 500 years). *Very rare* indicates that flooding is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year, or flooding is likely less than once in 100 years but more than once in 500 years). *Rare* indicates that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year, or flooding is likely 1 to 5 times in 100 years). *Occasional* indicates that flooding occurs infrequently under usual weather conditions (the chance of flooding is 5 to 50 percent in any year, or flooding is likely 5 to 50 times in 100 years). *Frequent* indicates that flooding is likely to occur often under usual weather conditions (the chance of flooding is more than 50 percent in any year, or flooding is likely more than 50 times in 100 years; but the chance of flooding is less than 50 percent in all months in any year). *Very frequent* indicates that flooding is likely to occur very often under usual weather conditions (the chance of flooding is more than 50 percent in all months of any year).

Flooding duration is the average duration of inundation per flood occurrence expressed as a class. *Extremely brief* is 0.1 hour to 4.0 hours; *very brief* is 4 to 48 hours; *brief* is 2 to 7 days; *long* is 7 to 30 days; and *very long* is more than 30 days. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 23 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of

uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1996 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 24 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Spodosol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Orthod (*Orth*, meaning the common ones, plus *od*, from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplorthods (*Hapl*, meaning minimal horizonation, plus *orthod*, the suborder of the Spodosols that has a horizon characterized by an accumulation of aluminum, iron, and organic carbon in which no one of the elements dominates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Alfic Haplorthods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, semiactive, frigid Alfic Haplorthods.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each

series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1996). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Alcona Series

The Alcona series consists of very deep, well drained, moderately permeable soils on dissected moraines, ground moraines, and till-floored lake plains. These soils formed in stratified loamy and sandy glaciolacustrine deposits. Slopes range from 1 to 70 percent.

Typical pedon of Alcona loamy very fine sand, in an area of Garlic-Alcona-Voelker complex, 8 to 35 percent slopes, dissected; 360 feet west and 350 feet south of the northeast corner of sec. 8, T. 46 N., R. 24 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 24 minutes 13 seconds N. and long. 87 degrees 19 minutes 33 seconds W.

Oe—0 to 3 inches; black (7.5YR 2.5/1), partially decomposed forest litter; moderately acid; abrupt smooth boundary.

E—3 to 9 inches; brown (7.5YR 5/2) loamy very fine sand, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; strongly acid; clear smooth boundary.

Bhs—9 to 13 inches; dark brown (7.5YR 3/2) very fine sandy loam; moderate fine subangular blocky structure; friable; many fine to coarse roots; strongly acid; clear smooth boundary.

Bs1—13 to 18 inches; dark brown (7.5YR 3/4) very fine sandy loam; moderate fine subangular blocky structure; friable; common fine to coarse roots; moderately acid; gradual smooth boundary.

Bs2—18 to 26 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; common fine to coarse roots; about 2 percent gravel; moderately acid; gradual wavy boundary.

B/E—26 to 49 inches; about 60 percent reddish brown (5YR 4/4) fine sandy loam (Bt); few distinct clay films on faces of peds; surrounded by brown (7.5YR 5/2) loamy fine sand, pinkish gray (7.5YR 7/2) dry (E); moderate medium subangular blocky structure; firm; few fine roots; about 2 percent gravel; moderately acid; clear smooth boundary.

2C1—49 to 63 inches; stratified reddish brown (5YR 5/3) loamy sand, reddish brown (5YR 4/4) fine sandy loam, and reddish gray (5YR 5/2) very fine sandy loam; massive with weakly expressed thin plates inherited from the parent material; friable; about 2 percent gravel; moderately acid; clear smooth boundary.

2C2—63 to 80 inches; stratified reddish brown (5YR 5/3) very fine sand and reddish brown (2.5YR 4/4) loamy very fine sand; massive with weakly expressed thin plates inherited from the parent material; friable; slightly acid.

The content of gravel ranges from 0 to 5 percent throughout, and the content of cobbles ranges from 0 to 2 percent throughout.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is dominantly loamy very fine sand, but the range includes fine sandy loam, very fine sandy loam, and loamy fine sand. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is very fine sandy loam, loamy very fine sand, fine sandy loam, or loamy fine sand.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is very fine sandy loam, loamy very fine sand, fine sandy loam, or loamy fine sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is very fine sandy loam, loamy very fine sand, fine sandy loam, or loamy fine sand.

The B part of the B/E horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam, fine sandy loam, loamy very fine sand, very fine sandy loam, or silt loam. The E part has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4. It is loamy sand, fine sandy loam, or loamy fine sand. Some pedons have a Bt or E/B horizon.

The 2C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 or 4. It is stratified loamy fine sand, fine sandy loam, very fine sand, loamy very fine sand, very fine sandy loam, or silt loam.

Amasa Series

The Amasa series consists of very deep, well drained soils on outwash terraces, disintegration moraines, and outwash plains. These soils formed in a loamy mantle over sandy and gravelly outwash. Permeability is moderate in the loamy mantle and rapid or very rapid in the lower part. Slopes range from 1 to 35 percent.

Typical pedon of Amasa very fine sandy loam, 1 to 6 percent slopes; 150 feet south and 800 feet west of the northeast corner of sec. 35, T. 45 N., R. 26 W.; USGS Cataract Basin topographic quadrangle; lat. 46 degrees 15 minutes 38 seconds N. and long. 87 degrees 30 minutes 50 seconds W.

A—0 to 2 inches; black (7.5YR 2.5/1) very fine sandy loam, dark gray (7.5YR 4/1) dry; moderate granular structure; very friable; many very fine to coarse roots; about 2 percent gravel, 2 percent cobbles, and 1 percent stones; very strongly acid; abrupt smooth boundary.

E—2 to 5 inches; brown (7.5YR 5/2) very fine sandy loam, pinkish gray (7.5YR 7/2) dry; moderate medium subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel, 2 percent cobbles, and 1 percent stones; strongly acid; clear smooth boundary.

Bhs—5 to 8 inches; dark brown (7.5YR 3/3) very fine sandy loam; moderate medium subangular blocky structure; very friable; many very fine to coarse roots; about 3 percent gravel, 2 percent cobbles, and 1 percent stones; strongly acid; clear wavy boundary.

Bs—8 to 16 inches; dark brown (7.5YR 3/4) very fine sandy loam; moderate medium subangular blocky structure; very friable; many very fine to coarse roots; about 10 percent gravel, 3 percent cobbles, and 1 percent stones; moderately acid; clear wavy boundary.

2C1—16 to 33 inches; brown (7.5YR 4/4) very gravelly sand; single grain; loose; common fine and medium roots; about 45 percent gravel, 7 percent cobbles, and 3 percent stones; moderately acid; gradual wavy boundary.

2C2—33 to 80 inches; brown (7.5YR 4/3) very gravelly sand; single grain; loose; few very fine and fine roots; about 45 percent gravel, 7 percent cobbles, and 3 percent stones; slightly acid.

The thickness of the loamy mantle ranges from 15 to 30 inches. The content of gravel ranges from 0 to 20 percent in the solum and from 0 to 50 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum. The content of stones ranges from 0 to 2 percent in the solum and from 0 to 5 percent in the substratum.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly very fine sandy loam, but the range includes fine sandy loam, gravelly fine sandy loam, and gravelly very fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 or 2. It is very fine sandy loam or fine sandy loam or the gravelly analogs of these textures.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is very fine sandy loam or fine sandy loam or the gravelly analogs of these textures.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is very fine sandy loam, fine sandy loam, or sandy loam or the gravelly analogs of these textures.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is very gravelly sand, gravelly sand, or sand.

Au Gres Series

The Au Gres series consists of very deep, somewhat poorly drained, rapidly permeable soils on outwash plains, till-floored lake plains, and outwash terraces. These soils formed in sandy glaciofluvial and glaciolacustrine deposits. Slopes range from 0 to 3 percent.

Typical pedon of Au Gres sand, 0 to 3 percent slopes; 2,550 feet north and 2,450 feet east of the southwest corner of sec. 30, T. 45 N., R. 24 W.; USGS Republic SW topographic quadrangle; lat. 46 degrees 16 minutes 51 seconds N. and long. 87 degrees 53 minutes 29 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; moderate very fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—2 to 8 inches; dark reddish gray (5YR 4/2) sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 1 percent gravel; very strongly acid; abrupt wavy boundary.

Bhs—8 to 11 inches; dark reddish brown (5YR 2.5/2) sand; strong fine subangular blocky structure; friable; many very fine to coarse roots; vertical tongues of dark reddish brown (5YR 3/2) and reddish brown (5YR 4/4), strongly cemented ortstein occupy 25 percent (10 of 40 inches) of the horizon; tongues are 2 to 4 inches wide and 5 to 16 inches apart and extend into the Bs1 horizon; common medium distinct yellowish red (5YR 5/6) masses of iron accumulation; about 1 percent gravel; strongly acid; clear irregular boundary.

Bs1—11 to 13 inches; dark reddish brown (5YR 3/4) sand; moderate fine subangular blocky structure; friable; many very fine to coarse roots; vertical tongues of dark reddish brown (5YR 3/2) and reddish brown (5YR 4/4), strongly cemented ortstein extend into the horizon from the Bhs horizon and occupy 30 percent (12 of 40 inches) of the horizon; tongues are 3 to 4 inches wide and 5 to 12 inches apart and extend into the Bs2 horizon to a depth of 24 inches; common fine distinct red (2.5YR 4/6) masses of iron accumulation; about 1 percent gravel; strongly acid; clear wavy boundary.

Bs2—13 to 27 inches; yellowish red (5YR 5/6) sand; weak medium subangular blocky structure; very friable; common very fine to medium roots; vertical tongues of reddish brown (5YR 4/4) and yellowish red (5YR 4/6), strongly cemented ortstein extend into the horizon from the Bs1 horizon and occupy 40 percent (16 of 40 inches) of the horizon; tongues are 4 to 6 inches wide and 3 to 4 inches apart; common medium faint yellowish red (5YR 5/8) masses of iron accumulation; about 1 percent gravel; strongly acid; gradual wavy boundary.

2C—27 to 80 inches; brown (7.5YR 5/4) sand; single grain; loose; few very fine to medium roots; common fine faint strong brown (7.5YR 5/6) masses of iron accumulation; about 1 percent gravel; strongly acid.

The content of gravel ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. It is dominantly sand, but the range includes loamy sand. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 2.5 or 3, and chroma of 2 or 3. It is sand or loamy sand. Some pedons do not have a Bhs horizon.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is sand or loamy sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand or loamy sand. Some pedons have a BC horizon.

The C horizon has hue of 5YR or 7.5YR and value and chroma of 4 to 6. It is sand or coarse sand.

Buckroe Series

The Buckroe series consists of excessively drained, very rapidly permeable soils that are shallow to bedrock. These soils are on sandstone benches. They formed in sandy and gravelly beach deposits overlying sandstone bedrock. Slopes range from 0 to 70 percent.

Typical pedon of Buckroe very channery loamy sand, 0 to 6 percent slopes, stony; 600 feet north and 2,300 feet east of the southwest corner of sec. 20, T. 52 N., R. 28 W.; USGS Howe Lake topographic quadrangle; lat. 46 degrees 52 minutes 56 seconds N. and long. 87 degrees 54 minutes 13 seconds W.

Oa—0 to 2 inches; black (10YR 2/1), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

Bw1—2 to 4 inches; reddish brown (5YR 4/3) very channery loamy sand, yellowish red (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 40 percent channers and 3 percent flagstones; extremely acid; clear wavy boundary.

Bw2—4 to 15 inches; reddish brown (5YR 4/4) very channery sand; single grain; loose; many very fine to coarse roots; about 45 percent channers and 10 percent flagstones; very strongly acid; abrupt wavy boundary.

2R—15 inches; dusky red (2.5YR 3/2) sandstone bedrock.

Depth to bedrock ranges from 10 to 20 inches. The content of channers ranges from 35 to 60 percent throughout, the content of flagstones ranges from 0 to 10 percent throughout, and the content of stones ranges from 0 to 3 percent throughout.

Some pedons have an A horizon. This horizon is very channery sand or very channery loamy sand. It has hue of 10YR, value of 2, and chroma of 1.

The Bw horizon has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is very channery loamy sand or very channery sand. Some pedons have a thin E horizon.

The underlying bedrock is sandstone.

Burt Series

The Burt series consists of poorly drained, rapidly permeable soils that are shallow to bedrock. These soils are in depressions and drainageways on sandstone benches. They formed in sandy glaciolacustrine deposits overlying sandstone bedrock. Slopes are 0 to 1 percent.

Typical pedon of Burt muck, 1,900 feet north and 210 feet east of the center of sec. 20, T. 51 N., R. 26 W.; USGS Big Bay topographic quadrangle; lat. 46 degrees 48 minutes 23 seconds N. and long. 87 degrees 37 minutes 56 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter; very strongly acid; clear smooth boundary.

Oa—2 to 5 inches; black (10YR 2/1) muck; weak fine granular structure; very friable; many very fine to coarse roots; very strongly acid; clear wavy boundary.

A—5 to 7 inches; black (10YR 2/1) mucky loamy sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; few very fine to coarse roots; about 3 percent gravel; very strongly acid; abrupt broken boundary.

Eg—7 to 8 inches; reddish gray (5YR 5/2) gravelly sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; about 18 percent gravel and 4 percent cobbles; strongly acid; gradual smooth boundary.

Bw—8 to 18 inches; dark reddish brown (2.5YR 3/4) gravelly sand; weak fine subangular blocky structure; very friable; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; about 18 percent gravel and 4 percent cobbles; strongly acid; abrupt smooth boundary.

2R—18 inches; dark reddish brown (5YR 3/3) sandstone bedrock.

Depth to bedrock ranges from 10 to 20 inches. The content of gravel ranges from 0 to 20 percent throughout, and the content of cobbles ranges from 0 to 5 percent throughout.

The Oa horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is mucky loamy sand, loamy sand, or sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is gravelly sand or sand.

The Bw horizon has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is gravelly sand or sand. Some pedons have a 2Cr horizon.

The underlying bedrock is sandstone.

Carbondale Series

The Carbondale series consists of very deep, very poorly drained soils in depressions on ground moraines, outwash plains, till-floored lake plains, and disintegration moraines. These soils formed in organic deposits. Permeability is moderately slow to moderately rapid. Slopes are 0 to 1 percent.

Typical pedon of Carbondale muck, in an area of Carbondale and Tawas soils; 2,900 feet south and 800 feet west of the northeast corner of sec. 9, T. 43 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 08 minutes 10 seconds N. and long. 87 degrees 33 minutes 25 seconds W.

Oa1—0 to 6 inches; muck, black (10YR 2/1) broken face and rubbed; about 10 percent fiber, 2 percent rubbed; weak fine granular structure; many very fine to coarse roots; slightly acid; clear wavy boundary.

Oa2—6 to 23 inches; muck, black (N 2.5/0) broken face and rubbed; about 10 percent fiber, 2 percent rubbed; weak medium subangular blocky structure; slightly acid; clear smooth boundary.

Oa3—23 to 38 inches; muck, black (N 2.5/0) broken face and rubbed; about 35 percent fiber, 10 percent rubbed; weak medium subangular blocky structure; slightly acid; clear smooth boundary.

Oe1—38 to 68 inches; mucky peat, black (10YR 2/1) broken face and rubbed; about 90 percent fiber, 33 percent rubbed; massive; neutral; clear smooth boundary.

Oe2—68 to 80 inches; mucky peat, black (10YR 2/1) broken face and rubbed; about 90 percent fiber, 20 percent rubbed; massive; neutral.

The organic layers are more than 51 inches thick. The content of wood fragments ranges to 15 percent in the form of twigs, branches, logs, or stumps throughout the profile.

The surface and subsurface tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are dominantly sapric. Some pedons have a fibric surface layer, which is 1 to 4 inches thick and is predominantly derived from sphagnum moss.

The bottom tier has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4. It is dominantly hemic, but some pedons may have thin fibric layers.

Carlshend Series

The Carlshend series consists of moderately well drained, moderately permeable soils that are shallow to bedrock. These soils are on sandstone benches. They formed in loamy till overlying sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Carlshend fine sandy loam, 1 to 6 percent slopes, stony; 900 feet north and 2,300 feet east of the southwest corner of sec. 20, T. 46 N., R. 23 W.; USGS Carlshend topographic quadrangle; lat. 46 degrees 22 minutes 03 seconds N. and long. 87 degrees 12 minutes 36 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; moderate fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—1 to 3 inches; dark reddish gray (5YR 4/2) fine sandy loam, light gray (5YR 7/1) dry; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt wavy boundary.

Bhs—3 to 6 inches; dark reddish brown (5YR 3/2) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; clear wavy boundary.

Bs—6 to 14 inches; dark reddish brown (5YR 3/4) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt wavy boundary.

2Cr—14 to 25 inches; yellowish brown (10YR 5/4), weathered sandstone; massive; very firm; few very fine to medium roots; common medium prominent strong brown (7.5YR 5/6) and common medium faint pale brown (10YR 6/3) masses of iron accumulation; few very fine to medium roots; moderately acid; abrupt smooth boundary.

2R—25 inches; light gray (10YR 7/2) and pale brown (10YR 6/3) sandstone bedrock.

Depth to the 2Cr horizon ranges from 10 to 20 inches. The content of gravel and cobbles ranges from 0 to 10 percent in the solum.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes sandy loam.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. It is fine sandy loam or sandy loam.

The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam or sandy loam.

The 2Cr horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is weathered sandstone.

The underlying bedrock is sandstone.

Cathro Series

The Cathro series consists of very deep, very poorly drained soils in depressions and drainageways on moraines and flood plains. These soils formed in organic deposits over loamy till. Permeability is moderately slow to moderately rapid in the organic part of the profile and moderately slow in the loamy part. Slopes are 0 to 1 percent.

Typical pedon of Cathro muck, in an area of Cathro-Ensley mucks; 1,270 feet south and 1,320 feet west of the northeast corner of sec. 25, T. 42 N., R. 26 W.; USGS Arnold topographic quadrangle; lat. 46 degrees 00 minutes 07 seconds N. and long. 87 degrees 29 minutes 50 seconds W.

Oa1—0 to 6 inches; muck, black (N 2.5/0) broken face and black (5YR 2.5/1) rubbed; weak thick platy structure; many very fine to medium roots; about 50 percent fiber, 15 percent rubbed; neutral; abrupt smooth boundary.

Oa2—6 to 18 inches; muck, black (10YR 2/1) broken face and black (5YR 2.5/1) rubbed; moderate very thick platy structure; few fine roots; about 40 percent fiber, 10 percent rubbed; slightly acid; abrupt smooth boundary.

Oa3—18 to 31 inches; muck, black (5YR 2.5/1) broken face and rubbed; massive; about 20 percent fiber, 5 percent rubbed; slightly acid; abrupt smooth boundary.

Cg—31 to 80 inches; dark grayish brown (10YR 4/2) fine sandy loam; massive; about 9 percent gravel and 5 percent cobbles; slightly effervescent; slightly alkaline.

Thickness of the organic layers and the depth to the loamy mineral horizon range from 16 to 51 inches. The content of wood fragments ranges to 15 percent in the form of twigs, branches, or logs in the organic part of the profile. In the mineral substratum, the content of gravel ranges from 0 to 20 percent and the content of cobbles ranges from 0 to 5 percent.

The surface and subsurface tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are dominantly sapric. Some pedons have a fibric surface layer, which is 1 to 3 inches thick and is predominantly derived from sphagnum moss.

The Cg horizon has hue of 5YR to 5GY, value of 4 or 5, and chroma of 1 or 2. It is fine sandy loam, sandy loam, or loam or the gravelly analogs of these textures. Some pedons have strata of sand less than 3 inches thick.

Chabeneau Series

The Chabeneau series consists of very deep, moderately well drained soils on outwash plains and outwash terraces. These soils formed in silty or loamy eolian deposits over sandy and gravelly outwash. Permeability is moderate in the upper part of the profile and very rapid in the lower part. Slopes range from 0 to 3 percent.

Typical pedon of Chabeneau silt loam, 0 to 3 percent slopes; 200 feet south and 730 feet east of the northwest corner of sec. 31, T. 47 N., R. 29 W.; USGS Republic topographic quadrangle; lat. 46 degrees 26 minutes 04 seconds N. and long. 87 degrees 59 minutes 18 seconds W.

Oe—0 to 1 inch; partially decomposed forest litter.

A—1 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine to coarse roots; about 3 percent gravel; extremely acid; abrupt wavy boundary.

E—2 to 5 inches; reddish gray (5YR 5/2) silt loam, light gray (5YR 7/1) dry; weak fine subangular blocky structure; friable; many fine to coarse roots; about 3 percent gravel; extremely acid; abrupt irregular boundary.

Bs1—5 to 10 inches; dark reddish brown (5YR 3/4) silt loam; weak fine subangular blocky structure; friable; many fine to coarse roots; about 8 percent gravel; strongly acid; clear wavy boundary.

Bs2—10 to 22 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; about 8 percent gravel; strongly acid; gradual wavy boundary.

2BC—22 to 30 inches; brown (7.5YR 4/4) gravelly loamy coarse sand; weak medium subangular blocky structure; very friable; common fine roots; about 31 percent gravel; strongly acid; clear wavy boundary.

2C1—30 to 48 inches; brown (10YR 5/3), stratified very gravelly coarse sand and coarse sand; single grain; loose; few fine roots; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation beginning at a depth of 33 inches; about 40 percent gravel and 10 percent cobbles; strongly acid; diffuse wavy boundary.

2C2—48 to 121 inches; brown (10YR 5/3), stratified sand and gravelly sand; single grain; loose; few fine roots in the upper 12 inches of the horizon; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 24 percent gravel and 5 percent cobbles; strongly acid.

The thickness of the silty or loamy mantle ranges from 15 to 30 inches. The content of gravel ranges from 0 to 15 percent in the loamy upper part and from 0 to 60 percent in the sandy lower part. The content of cobbles ranges from 0 to 5 percent in the loamy upper part and from 0 to 10 percent in the sandy lower part.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly silt loam, but the range includes very fine sandy loam or fine sandy loam or the gravelly analogs of these textures.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 or 2. It is silt loam, very fine sandy loam, or fine sandy loam or the gravelly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is silt loam, very fine sandy loam, or fine sandy loam or the gravelly analogs of these textures.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. It is silt loam, very fine sandy loam, or fine sandy loam or the gravelly analogs of these textures.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is coarse sand, sand, or loamy coarse sand or the gravelly or very gravelly analogs of these textures.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sand or coarse sand or the gravelly, very gravelly, or cobbly analogs of these textures. Stratification is common.

Champion Series

The Champion series consists of very deep, moderately well drained soils on ground moraines and bedrock-controlled moraines. These soils are shallow or moderately deep to a fragipan. They formed in a silty or loamy mantle over loamy or sandy till. Permeability is moderate in the upper part of the profile, very slow in the fragipan, and moderately rapid in the substratum. Slopes range from 1 to 18 percent.

Typical pedon of Champion cobbly fine sandy loam, 6 to 18 percent slopes, very stony; 400 feet west and 1,000 feet north of the southeast corner of sec. 21, T. 50 N., R. 29 W.; USGS Bulldog Lake topographic quadrangle; lat. 46 degrees 42 minutes 39 seconds N. and long. 87 degrees 55 minutes 47 seconds W.

Oa—0 to 2 inches; black (5YR 2.5/1), well decomposed forest litter; moderate fine granular structure; very friable; many very fine to coarse roots; abrupt smooth boundary.

E—2 to 5 inches; dark reddish gray (5YR 4/2) cobbly fine sandy loam, pinkish gray (5YR 6/2) dry; moderate very fine subangular blocky structure; friable; many very fine to coarse roots; about 13 percent cobbles and 4 percent gravel; very strongly acid; abrupt wavy boundary.

Bhs—5 to 9 inches; dark reddish brown (5YR 3/3) cobbly fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 13 percent cobbles and 4 percent gravel; strongly acid; clear wavy boundary.

Bs—9 to 26 inches; reddish brown (5YR 4/4) cobbly fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 13 percent cobbles and 4 percent gravel; strongly acid; abrupt wavy boundary.

2Bx1—26 to 36 inches; reddish brown (5YR 4/3) gravelly sandy loam; weak thick platy structure; very firm; common very fine and fine roots; roots are 12 to 20 inches apart; common very fine and fine vesicular pores; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation; about 16 percent gravel and 4 percent cobbles; moderately acid; gradual wavy boundary.

2Bx2—36 to 43 inches; brown (7.5YR 4/4) gravelly loamy sand; weak thick platy structure; very firm; few very fine and fine roots; roots are 12 to 20 inches apart; common very fine and fine vesicular pores; fine faint strong brown (7.5YR 5/6) masses of iron accumulation; about 16 percent gravel and 8 percent cobbles; moderately acid; abrupt wavy boundary.

2C—43 to 80 inches; brown (10YR 4/3) gravelly loamy sand; massive; very friable; few very fine and fine roots; about 16 percent gravel and 8 percent cobbles; strongly acid.

Depth to the fragipan ranges from 18 to 24 inches. The content of gravel ranges from 2 to 10 percent above the fragipan and from 10 to 25 percent in the fragipan and the substratum. The content of cobbles ranges from 0 to 15 percent throughout the profile, and the content of stones ranges from 0 to 5 percent throughout the profile. The content of rock fragments averages less than 35 percent in the control section.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 or 2. It is dominantly cobbly fine sandy loam, but the range includes cobbly very fine sandy loam. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR, value of 3, and chroma of 2 or 3. It is fine sandy loam or very fine sandy loam or the cobbly analogs of these textures.

The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam or very fine sandy loam or the cobbly analogs of these textures.

The 2Bx1 horizon has hue of 5YR to 10YR, value of 4, and chroma of 2 to 4. It is gravelly sandy loam, gravelly fine sandy loam, or gravelly loamy sand.

The 2Bx2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is gravelly loamy sand, gravelly sandy loam, or gravelly fine sandy loam.

The 2C horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is gravelly loamy sand, gravelly sandy loam, or gravelly fine sandy loam. It has pockets of gravelly sand in some pedons.

Channing Series

The Channing series consists of very deep, somewhat poorly drained soils on outwash terraces and outwash plains. These soils formed in a loamy mantle over sandy outwash. Permeability is moderate in the loamy upper part of the profile and very rapid in the sandy lower part. Slopes range from 0 to 3 percent.

Typical pedon of Channing fine sandy loam, 0 to 3 percent slopes; 1,270 feet south of the northwest corner of sec. 4, T. 47 N., R. 28 W.; USGS Diorite topographic quadrangle; lat. 46 degrees 30 minutes 12 seconds N. and long. 87 degrees 49 minutes 26 seconds W.

Oe—0 to 1 inch; black (N 2.5/0), partially decomposed forest litter; very strongly acid; abrupt smooth boundary.
A—1 to 5 inches; dark reddish brown (5YR 3/2) fine sandy loam, dark gray (5YR 4/1) dry; moderate medium granular structure; friable; many fine to coarse roots; about 5 percent gravel; very strongly acid; clear wavy boundary.
E—5 to 9 inches; reddish gray (5YR 5/2) very fine sandy loam, pinkish gray (7.5YR 7/2) dry; moderate medium platy structure; friable; many fine to coarse roots; many medium distinct brown (7.5YR 4/2) and common medium faint dark gray (5YR 4/1) iron depletions; about 5 percent gravel; strongly acid; clear wavy boundary.
Bs1—9 to 18 inches; brown (7.5YR 4/4) very fine sandy loam; moderate medium subangular blocky structure; friable; many fine to coarse roots; common medium distinct brown (7.5YR 4/2) iron depletions; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 5 percent gravel; strongly acid; gradual wavy boundary.
Bs2—18 to 22 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common medium and fine roots; common medium distinct brown (7.5YR 4/2) iron depletions; common medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; about 5 percent gravel; strongly acid; clear smooth boundary.
2BC—22 to 28 inches; strong brown (7.5YR 4/6) gravelly sand; single grain; loose; few fine roots; common medium distinct dark yellowish brown (10YR 3/6) masses of iron accumulation; about 10 percent gravel and 5 percent cobbles; moderately acid; clear smooth boundary.
2C—28 to 80 inches; brown (10YR 4/3), stratified gravelly sand, sand, and very gravelly sand; single grain; loose; about 20 percent gravel and 10 percent cobbles; moderately acid.

The content of gravel ranges from 0 to 50 percent in the solum and from 15 to 50 percent in the substratum. The content of cobbles ranges from 0 to 10 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly fine sandy loam, but the range includes very fine sandy loam.

The E horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. It is fine sandy loam or very fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is very fine sandy loam or fine sandy loam. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. It is fine sandy loam or very fine sandy loam.

The 2BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is sand or gravelly sand.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is stratified sand, gravelly sand, and very gravelly sand.

Charlevoix Series

The Charlevoix series consists of very deep, somewhat poorly drained, moderately permeable soils on fluted ground moraines. These soils formed in loamy till. Slopes range from 0 to 3 percent.

Typical pedon of Charlevoix silt loam, in an area of Charlevoix-Ensley complex, bedrock substratum, 0 to 3 percent slopes; 2,300 feet north and 1,850 feet east of the

southwest corner of sec. 34, T. 44 N., R. 23 W.; lat. 46 degrees 09 minutes 52.68 seconds N. and long. 87 degrees 10 minutes 13.01 seconds W.

Oa—0 to 2 inches; black (7.5YR 2.5/1), well decomposed forest litter; many very fine to coarse roots; about 4 percent cobbles; strongly acid; abrupt smooth boundary.

A—2 to 3 inches; very dark gray (7.5YR 3/1) silt loam, gray (7.5YR 6/1) dry; moderate fine granular structure; very friable; many very fine to coarse roots; about 5 percent gravel and 4 percent cobbles; extremely acid; clear wavy boundary.

E—3 to 8 inches; brown (7.5YR 5/3) silt loam, white (7.5YR 8/1) dry; weak medium platy structure; friable; common very fine to coarse roots; common medium faint brown (7.5YR 5/2) iron depletions; common fine faint brown (7.5YR 5/4) masses of iron accumulation; about 6 percent gravel and 4 percent cobbles; extremely acid; clear wavy boundary.

Bs—8 to 12 inches; brown (7.5YR 4/4) silt loam; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine roots; many medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 6 percent gravel and 4 percent cobbles; strongly acid; gradual broken boundary.

E/B—12 to 16 inches; about 60 percent reddish brown (5YR 5/3) fine sandy loam, white (7.5YR 8/1) dry (E); occurs as tongues extending into or completely surrounding isolated remnants of reddish brown (5YR 4/4) fine sandy loam (Bt); common distinct brown (10YR 4/3) clay films on faces of peds; weak medium platy structure parting to weak very fine subangular blocky; firm; common very fine vesicular pores; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 5 percent gravel and 4 percent cobbles; slightly acid; clear wavy boundary.

B/E—16 to 28 inches; about 60 percent reddish brown (5YR 4/4) fine sandy loam (Bt); many distinct brown (10YR 4/3) clay films on faces of peds; penetrated by tongues of reddish brown (5YR 5/3) fine sandy loam, white (5YR 8/1) dry (E); weak medium subangular blocky structure; friable; common very fine vesicular pores; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 5 percent gravel and 4 percent cobbles; neutral; gradual wavy boundary.

C—28 to 70 inches; reddish brown (5YR 5/4) cobbly fine sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 8 percent gravel and 8 percent cobbles; slightly effervescent; moderately alkaline; abrupt smooth boundary.

2R—70 inches; unweathered limestone bedrock.

The content of gravel ranges from 0 to 10 percent in the solum and from 5 to 20 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum.

Some pedons have bedrock at a depth of more than 80 inches.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1. It is dominantly silt loam, but the range includes very fine sandy loam and fine sandy loam.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, very fine sandy loam, or fine sandy loam. Some pedons have a Bhs horizon.

The E part of the E/B and B/E horizons has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It is fine sandy loam, loamy fine sand, or loamy sand. The Bt part of the E/B and B/E horizons has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4. It is fine sandy loam, sandy loam, or sandy clay loam.

The C horizon has hue of 5YR, value of 5, and chroma of 3 or 4. It is cobbly fine sandy loam or gravelly fine sandy loam.

The underlying bedrock is limestone or dolomitic sandstone.

Chippeny Series

The Chippeny series consists of very poorly drained soils that are moderately deep to bedrock. These soils are in depressions and drainageways on ground moraines. They formed in organic deposits over loamy till overlying limestone, dolomite, or dolomitic sandstone bedrock. Permeability is moderately slow to moderately rapid in the organic part of the profile and moderate or moderately slow in the loamy part. Slopes are 0 to 1 percent.

Typical pedon of Chippeny muck, in an area of Chippeny and Nahma mucks; 1,280 feet west and 2,530 feet south of the northeast corner of sec. 31, T. 44 N., R. 23 W.; USGS McFarland topographic quadrangle; lat. 46 degrees 10 minutes 45 seconds N. and long. 87 degrees 08 minutes 45 seconds W.

Oa1—0 to 6 inches; muck, black (10YR 2/1) broken face and rubbed; about 15 percent fiber, 2 percent rubbed; weak fine granular structure; very friable; many very fine to coarse roots; neutral; clear smooth boundary.

Oa2—6 to 29 inches; muck, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed; about 40 percent fiber, 5 percent rubbed; massive; very friable; slightly acid; gradual smooth boundary.

Cg1—29 to 33 inches; very dark gray (10YR 3/1) silt loam; massive; friable; neutral; clear wavy boundary.

Cg2—33 to 38 inches; gray (5Y 5/1) silt loam; massive; friable; neutral; abrupt smooth boundary.

2R—38 inches; gray (7.5YR 5/1) limestone bedrock.

Thickness of the organic layers and depth to the loamy material range from 16 to 50 inches. Depth to bedrock ranges from 20 to 51 inches. The content of wood fragments ranges to 15 percent in the form of twigs, branches, or logs in the organic part of the profile. In the C horizon, the content of gravel ranges from 0 to 15 percent and the content of cobbles, channers, and flagstones ranges from 0 to 10 percent.

The surface and subsurface tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are dominantly sapric.

The Cg horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. It is silt loam, fine sandy loam, or gravelly fine sandy loam.

The underlying bedrock is limestone, dolomite, or dolomitic sandstone.

Chocolay Series

The Chocolay series consists of moderately well drained soils that are moderately deep to bedrock. These soils are on sandstone benches. They formed in loamy till overlying sandstone. Permeability is moderate. Slopes range from 1 to 6 percent.

Typical pedon of Chocolay very cobbly fine sandy loam, 1 to 6 percent slopes, very stony; 100 feet south and 1,200 feet east of the northwest corner of sec. 34, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 25 minutes 51 seconds N. and long. 87 degrees 10 minutes 10 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; moderate very fine granular structure; very friable; many very fine to coarse roots; about 15 percent stones; very strongly acid; abrupt smooth boundary.

A—2 to 3 inches; black (10YR 2/1) very cobbly fine sandy loam, gray (5YR 5/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 25 percent cobbles, 18 percent gravel, and 15 percent stones; very strongly acid; abrupt smooth boundary.

E—3 to 8 inches; reddish brown (5YR 4/3) very cobbly fine sandy loam, pinkish gray (5YR 6/2) dry; moderate fine subangular blocky structure; friable; many very fine to

coarse roots; about 25 percent cobbles, 18 percent gravel, and 15 percent stones; very strongly acid; abrupt wavy boundary.

Bhs—8 to 14 inches; dark reddish brown (5YR 3/3) very cobbly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 25 percent cobbles, 18 percent gravel, and 15 percent stones; strongly acid; clear irregular boundary.

Bs—14 to 27 inches; reddish brown (5YR 4/4) very gravelly sandy loam; weak fine subangular blocky structure; friable; common very fine to medium roots; few medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; about 30 percent gravel, 15 percent cobbles, and 10 percent stones; strongly acid; abrupt wavy boundary.

2R—27 inches; reddish brown (2.5YR 4/3) sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 15 to 40 percent throughout the profile, the content of cobbles ranges from 15 to 40 percent throughout the profile, and the content of stones ranges from 5 to 20 percent throughout the profile. The content of rock fragments averages more than 35 percent in the control section. The rock fragments are dominantly sandstone.

The A horizon has hue of 10YR, value of 2, and chroma of 1. It is dominantly very cobbly fine sandy loam, but the range includes very cobbly sandy loam, very gravelly sandy loam, and very gravelly fine sandy loam.

The E horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 1 to 3. It is the very cobbly or very gravelly analogs of fine sandy loam or sandy loam.

The Bhs horizon has hue of 5YR, value of 3, and chroma of 2 or 3. It is very cobbly fine sandy loam or very gravelly fine sandy loam.

The Bs horizon has hue of 5YR and value and chroma of 3 or 4. It is the very cobbly or very gravelly analogs of fine sandy loam or sandy loam. Some pedons contain thin layers of very gravelly coarse sand above the sandstone bedrock. Some pedons have a Cr horizon.

The underlying bedrock is sandstone.

Croswell Series

The Croswell series consists of very deep, moderately well drained, rapidly permeable soils on beach ridges, outwash plains, outwash terraces, and till-floored lake plains. These soils formed in sandy glaciolacustrine deposits and outwash. Slopes range from 0 to 6 percent.

Typical pedon of Croswell sand, 0 to 3 percent slopes; 600 feet north and 1,650 feet west of the southeast corner of sec. 23, T. 45 N., R. 29 W.; USGS Republic SW topographic quadrangle; lat. 46 degrees 17 minutes 09 seconds N. and long. 87 degrees 53 minutes 37 seconds W.

A—0 to 3 inches; very dark brown (10YR 2/2) sand, dark grayish brown (10YR 4/2) dry; weak very fine granular structure; very friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt smooth boundary.

E—3 to 7 inches; pinkish gray (5YR 6/2) sand, pinkish gray (7.5YR 6/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt smooth boundary.

Bs1—7 to 14 inches; reddish brown (5YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; clear wavy boundary.

Bs2—14 to 22 inches; yellowish red (5YR 4/6) sand; weak fine subangular blocky structure; very friable; few very fine to medium roots; tongues of dark reddish brown (5YR 3/4), moderately cemented ortstein occupy 13 percent (5 of 40

inches) of the horizon; tongues are 2 to 3 inches wide and 8 to 29 inches apart and extend into the Bs3 horizon; about 2 percent gravel; moderately acid; gradual wavy boundary.

Bs3—22 to 34 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few very fine to medium roots; tongues of reddish brown (5YR 4/4), moderately cemented ortstein extend into the horizon from the Bs2 horizon and occupy 15 percent (6 of 40 inches) of the horizon; tongues are 2 to 3 inches wide and 8 to 29 inches apart and extend into the C horizon to a depth of 38 inches; common fine distinct strong brown (7.5YR 5/8) masses of iron accumulation beginning at a depth of about 26 inches; about 2 percent gravel; moderately acid; gradual wavy boundary.

C—34 to 80 inches; light brown (7.5YR 6/4) sand; single grain; loose; few very fine to fine roots; common fine distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 2 percent gravel; moderately acid.

The content of gravel ranges from 0 to 5 percent throughout. The profile is sand throughout.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or 2.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 2.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4.

The Bs2 and Bs3 horizons have hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. Some pedons have a BC horizon.

The C horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 6.

Cunard Series

The Cunard series consists of well drained, moderately permeable soils that are moderately deep to bedrock. These soils are on ground moraines. They formed in loamy till overlying dolomite, limestone, or dolomitic sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Cunard fine sandy loam, 1 to 6 percent slopes; 450 feet east and 2,200 feet north of the southwest corner of sec. 31, T. 43 N., R. 25 W.; USGS Arnold topographic quadrangle; lat. 46 degrees 04 minutes 42 seconds N. and long. 87 degrees 29 minutes 26 seconds W.

A—0 to 4 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 7 percent cobbles, 4 percent gravel, and 1 percent stones; neutral; clear broken boundary.

E/B—4 to 6 inches; about 60 percent brown (7.5YR 4/2) fine sandy loam, pinkish gray (7.5YR 6/2) dry (E); occurs as tongues extending into or completely surrounding isolated remnants of brown (7.5YR 4/4) fine sandy loam (B); moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 7 percent cobbles, 4 percent gravel, and 1 percent stones; neutral; clear wavy boundary.

Bw—6 to 10 inches; brown (7.5YR 4/4) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 7 percent cobbles, 4 percent gravel, and 1 percent stones; neutral; clear wavy boundary.

Bt—10 to 19 inches; dark brown (7.5YR 3/4) loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; common distinct discontinuous dark brown (7.5YR 3/4) clay films on faces of peds; about 7 percent cobbles, 4 percent gravel, and 2 percent stones; slightly alkaline; clear wavy boundary.

2C—19 to 27 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive; friable; common very fine to medium roots; about 18 percent gravel, 10 percent cobbles,

and 2 percent stones; slightly effervescent; slightly alkaline; abrupt smooth boundary.
3R—27 inches; pale brown (10YR 6/3) dolomitic sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 10 percent in the solum and from 10 to 25 percent in the substratum. The content of cobbles and flagstones ranges from 0 to 10 percent throughout the profile. The content of stones ranges from 0 to 2 percent throughout the profile. The content of rock fragments averages less than 35 percent in the control section.

The A horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is dominantly fine sandy loam, but the range includes loam. Some pedons have an E horizon.

The E part of the E/B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. The B part of the E/B horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 3 or 4. The E/B horizon is fine sandy loam or sandy loam. Some pedons have a B/E horizon.

The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is fine sandy loam or sandy loam.

The Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loam, fine sandy loam, or sandy loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. It is gravelly fine sandy loam or cobbly fine sandy loam.

The underlying bedrock is dolomite, dolomitic sandstone, or limestone.

Dawson Series

The Dawson series consists of very deep, very poorly drained soils in depressions on outwash plains, till-floored lake plains, and moraines. These soils formed in organic deposits overlying sandy outwash. Permeability is moderately rapid to moderately slow in the organic part of the profile and rapid in the sandy part. Slopes are 0 to 1 percent.

Typical pedon of Dawson peat, in an area of Greenwood and Dawson soils; in the Sand River area; 900 feet west and 400 feet south of the northeast corner of sec. 9, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 29 minutes 30 seconds N. and long. 87 degrees 11 minutes 02 seconds W.

Oi—0 to 6 inches; peat, dark brown (10YR 3/3) broken face, brown (10YR 4/3) rubbed; about 100 percent fiber, 90 percent rubbed; massive; many very fine to coarse roots; extremely acid; abrupt smooth boundary.
Oa1—6 to 11 inches; muck, black (10YR 2/1) broken face and rubbed; about 40 percent fiber, 15 percent rubbed; massive; few very fine to medium roots; extremely acid; clear smooth boundary.
Oa2—11 to 34 inches; muck, very dark brown (10YR 2/2) broken face and rubbed; about 30 percent fiber, 5 percent rubbed; massive; extremely acid; clear wavy boundary.
A—34 to 36 inches; black (10YR 2/1) sand; massive; very friable; extremely acid; clear smooth boundary.
C—36 to 80 inches; dark grayish brown (10YR 4/2) sand; single grain; loose; very strongly acid.

The thickness of the organic layers and the depth to the sandy mineral horizon range from 16 to 51 inches. The organic material is primarily herbaceous.

The surface tier has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. It is dominantly fibric material derived from sphagnum moss.

The subsurface and bottom tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are dominantly sapric.

The A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 to 3. It is sand, fine sand, mucky sand, or mucky fine sand.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is sand, fine sand, loamy fine sand, or loamy sand.

Deer Park Series

The Deer Park series consists of very deep, excessively drained, rapidly permeable soils on beach ridges and dunes. These soils formed in sandy beach deposits. Slopes range from 1 to 18 percent.

Typical pedon of Deer Park sand, 1 to 10 percent slopes; 900 feet west and 800 feet south of the northeast corner of sec. 24, T. 51 N., R. 27 W.; in the Lake Independence area; USGS Big Bay topographic quadrangle; lat. 46 degrees 48 minutes 26 seconds N. and long. 87 degrees 40 minutes 06 seconds W.

Oe—0 to 1 inch; black (10YR 2/1), partially decomposed forest litter; very strongly acid; clear wavy boundary.

A—1 to 3 inches; very dark gray (10YR 3/1) sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; very strongly acid; clear wavy boundary.

E—3 to 11 inches; pale brown (10YR 6/3) sand, pinkish gray (7.5YR 6/2) dry; single grain; loose; many very fine to coarse roots; very strongly acid; clear wavy boundary.

Bs1—11 to 20 inches; strong brown (7.5YR 5/6) sand; single grain; loose; many very fine to coarse roots; very strongly acid; gradual wavy boundary.

Bs2—20 to 28 inches; brown (7.5YR 5/4) sand; single grain; loose; common very fine to medium roots; discontinuous vertical tongues of brown (7.5YR 4/4), moderately cemented ortstein occupy 25 percent (10 of 40 inches) of the horizon and extend into the C horizon to a depth of 32 inches; tongues are 3 to 6 inches wide and 5 to 20 inches apart; strongly acid; gradual wavy boundary.

C—28 to 80 inches; pale brown (10YR 6/3) sand; single grain; loose; few very fine to medium roots; strongly acid.

The depth to ortstein ranges from 10 to 25 inches. The profile is sand throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3.

The Bs1 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The Bs2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. Some pedons have a BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 6, and chroma of 3 or 4.

Deford Series

The Deford series consists of very deep, poorly drained, rapidly permeable soils in depressions and drainageways on outwash plains, till-floored lake plains, beach ridges, and moraines. These soils formed in sandy outwash. Slopes range from 0 to 2 percent.

Typical pedon of Deford muck, 1,300 feet north and 1,150 feet west of the southeast corner of sec. 20, T. 44 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 12 minutes 38 seconds N. and long. 87 degrees 36 minutes 35 seconds W.

Oa—0 to 6 inches; black (N 2.5/0) muck; moderate very fine granular structure; very friable; many very fine to coarse roots; moderately acid; abrupt wavy boundary.

Cg1—6 to 18 inches; grayish brown (10YR 5/2) sand; single grain; loose; few very fine to medium roots; few fine distinct yellowish brown (10YR 5/6) and common

medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation; about 1 percent gravel; moderately acid; gradual wavy boundary.

Cg2—18 to 30 inches; brown (10YR 5/3) sand; single grain; loose; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; few medium prominent dark gray (10YR 4/1) iron depletions; about 1 percent gravel; moderately acid; gradual wavy boundary.

Cg3—30 to 80 inches; very dark gray (2.5Y 3/1) sand; single grain; loose; about 2 percent gravel; moderately acid.

The thickness of the organic layer ranges from 2 to 8 inches. The content of gravel ranges from 0 to 8 percent in the mineral horizons.

The Oa horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1.

The C horizons have hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. They are sand, fine sand, loamy sand, or loamy fine sand.

Dishno Series

The Dishno series consists of moderately well drained soils that are deep to bedrock. These soils are on bedrock-controlled moraines. They formed in silty and loamy deposits over sandy and gravelly till overlying igneous or metamorphic bedrock. Permeability is moderate in the loamy material and moderately rapid in the sandy material. Slopes range from 1 to 18 percent.

Typical pedon of Dishno cobbly silt loam, in an area of Dishno-Witbeck-Rock outcrop complex, 0 to 12 percent slopes, very bouldery; 583 feet north and 1,832 feet east of the southwest corner of sec. 33, T. 49 N., R. 29 W.; USGS Champion topographic quadrangle; lat. 46 degrees 35 minutes 39.3 seconds N. and long. 87 degrees 56 minutes 16 seconds W.

Oe—0 to 1 inch; dark reddish brown (5YR 2.5/2), partially decomposed forest litter; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

A—1 to 3 inches; dark reddish brown (5YR 3/2) cobbly silt loam, reddish gray (5YR 5/2) dry; moderate very fine granular structure; friable; many very fine to coarse roots; few very fine vesicular pores; about 10 percent cobbles, 9 percent gravel, 5 percent stones, and 1 percent boulders; extremely acid; clear wavy boundary.

E—3 to 9 inches; reddish gray (5YR 5/2) cobbly silt loam, light gray (5YR 7/1) dry; weak medium platy structure parting to weak very fine subangular blocky; friable; many very fine to coarse roots; few very fine vesicular pores; about 10 percent cobbles, 9 percent gravel, 5 percent stones, and 1 percent boulders; extremely acid; abrupt wavy boundary.

Bhs—9 to 10 inches; dark brown (7.5YR 3/2) cobbly loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; few very fine vesicular pores; about 10 percent cobbles, 7 percent gravel, 5 percent stones, and 1 percent boulders; very strongly acid; abrupt broken boundary.

Bs1—10 to 18 inches; dark brown (7.5YR 3/4) cobbly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; few very fine vesicular pores; about 10 percent cobbles, 7 percent gravel, 5 percent stones, and 1 percent boulders; very strongly acid; clear wavy boundary.

Bs2—18 to 22 inches; brown (7.5YR 4/4) cobbly loamy sand; weak medium platy structure; firm; common very fine to coarse roots; common very fine vesicular pores; about 10 percent cobbles, 7 percent gravel, 5 percent stones, and 1 percent boulders; strongly acid; abrupt broken boundary.

2BC—22 to 29 inches; brown (10YR 4/3) very stony loamy sand; massive; weak thick platiness inherent from deposition; dominantly friable but firm in places; few very fine to medium roots; few very fine vesicular pores; discontinuous silt coats on

rock fragments; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 13 percent gravel, 10 percent cobbles, 10 percent stones, and 5 percent boulders; strongly acid; gradual wavy boundary.

2C—29 to 46 inches; light olive brown (2.5Y 5/3) very stony loamy sand; massive with weakly expressed thick platiness inherent from deposition; dominantly friable but firm in places; few very fine to medium roots; few very fine vesicular pores; discontinuous silt coats on rock fragments; few medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 13 percent gravel, 10 percent cobbles, 10 percent stones, and 5 percent boulders; moderately acid; abrupt smooth boundary.

3R—46 inches; brown (10YR 4/3), unweathered gneiss bedrock; discontinuous brown layer of (10YR 4/3) loamy coarse sand saprolite $^1/_8$ inch thick on surface of bedrock; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation on surface of bedrock; strongly acid.

The thickness of the loamy eolian material ranges from 18 to 30 inches. Depth to bedrock ranges from 40 to 60 inches. The content of gravel ranges from 1 to 10 percent in the loamy material and from 10 to 25 percent in the sandy material. The content of cobbles ranges from 0 to 15 percent throughout the profile, the content of stones ranges from 0 to 10 percent throughout the profile, and the content of boulders ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is silt loam, loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bs2 horizon has hue of 5YR to 10YR, value of 4, and chroma of 3 to 6. It is silt loam, very fine sandy loam, fine sandy loam, or loamy sand or the cobbly analogs of these textures.

The 2BC horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 or 4. It is the very stony, gravelly, or cobbly analogs of loamy sand.

The 2C horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is the very stony, gravelly, or cobbly analogs of loamy sand.

The underlying bedrock is igneous or metamorphic.

Duel Series

The Duel series consists of well drained, rapidly permeable soils that are moderately deep to bedrock. These soils are on bedrock benches. They formed in sandy outwash overlying dolomitic sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Duel loamy sand, 1 to 6 percent slopes, very stony; 900 feet south and 75 feet west of the northeast corner of sec. 15, T. 46 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 23 minutes 19.35 seconds N. and long. 87 degrees 09 minutes 31.18 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed leaf litter; many very fine to coarse roots; moderately acid; clear wavy boundary.

Bs—1 to 22 inches; dark reddish brown (5YR 3/4) loamy sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; remnants of reddish brown (5YR 4/3) material from the E horizon mixed in the upper part of this horizon; about 8 percent channers, 3 percent gravel, and 1 percent stones; strongly acid; abrupt irregular boundary.

2Cr—22 to 32 inches; dark brown (7.5YR 3/4) and pale brown (10YR 6/3), soft and weathered dolomitic sandstone; common very fine to medium roots in cracks; slightly alkaline; gradual irregular boundary.

2R—32 inches; pale brown (10YR 6/3) dolomitic sandstone bedrock; few very fine and fine roots in fractures; slightly effervescent; slightly alkaline.

Depth to bedrock ranges from 20 to 40 inches. Throughout the profile, the content of gravel ranges from 0 to 5 percent, the content of cobbles ranges from 0 to 5 percent, the content of channers ranges from 0 to 10 percent, and the content of stones and boulders ranges from 0 to 5 percent. The total content of rock fragments is less than 15 percent.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is loamy sand or sand. Some pedons have an A horizon.

The Cr horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 or 4. It is soft and weathered bedrock. Some pedons have a C horizon.

The underlying bedrock is dolomitic sandstone or limestone.

Emmet Series

The Emmet series consists of very deep, well drained soils on drumlins and ground moraines. These soils formed in loamy till. Permeability is moderate in the solum and moderately slow in the substratum. Slopes range from 1 to 35 percent.

Typical pedon of Emmet fine sandy loam, 1 to 6 percent slopes; in the Gleason Creek area; 2,300 feet east and 1,250 feet north of the southwest corner of sec. 35, T. 44 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 09 minutes 15 seconds N. and long. 87 degrees 31 minutes 54 seconds W.

A—0 to 3 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many very fine to coarse roots; about 3 percent gravel and 2 percent cobbles; neutral; abrupt wavy boundary.

E—3 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, gray (10YR 6/1) dry; moderate medium subangular blocky structure; friable; common very fine to coarse roots; about 3 percent gravel and 2 percent cobbles; neutral; clear irregular boundary.

Bw—5 to 21 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; about 3 percent gravel and 2 percent cobbles; neutral; gradual wavy boundary.

Bt—21 to 28 inches; yellowish red (5YR 4/6) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine and few medium roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent gravel and 3 percent cobbles; slightly alkaline; gradual smooth boundary.

C—28 to 80 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; few fine roots; about 14 percent gravel, 7 percent cobbles, and 3 percent stones; slightly effervescent; slightly alkaline.

The depth to carbonates ranges from 24 to 40 inches. The content of gravel ranges from 2 to 10 percent in the solum and from 10 to 25 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum. The content of stones ranges from 0 to 3 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly fine sandy loam, but the range includes sandy loam.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 1 to 3. It is fine sandy loam or sandy loam.

The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sandy loam or sandy loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is sandy loam or fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is gravelly fine sandy loam.

Ensley Series

The Ensley series consists of very deep, poorly drained, moderately permeable soils in depressions and drainageways on ground moraines. These soils formed in loamy till. Slopes are 0 to 1 percent.

Typical pedon of Ensley muck, 120 feet west and 200 feet south of the northeast corner of sec. 9, T. 43 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 08 minutes 39 seconds N. and long. 87 degrees 33 minutes 16 seconds W.

Oa—0 to 5 inches; black (10YR 2/1) muck; moderate fine granular structure; very friable; many very fine to coarse roots; neutral; clear wavy boundary.

A—5 to 7 inches; black (10YR 2/1) mucky loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 3 percent gravel; neutral; clear smooth boundary.

Bw—7 to 19 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common very fine to medium roots; common fine prominent light brownish gray (10YR 6/2) iron depletions; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 8 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

C—19 to 80 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive with weakly expressed thick platiness inherent from deposition; friable; few very fine and fine roots; about 20 percent gravel and 5 percent cobbles; slightly effervescent; slightly alkaline.

The depth to carbonates ranges from 15 to 30 inches. The content of gravel ranges from 1 to 10 percent in the solum and from 10 to 25 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum. The content of stones ranges from 0 to 2 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly mucky loam, but the range includes mucky fine sandy loam and mucky sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. It is sandy loam, fine sandy loam, or loam.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. It is gravelly fine sandy loam.

Escanaba Series

The Escanaba series consists of very deep, well drained soils on drumlins and ground moraines. These soils formed in a sandy mantle over loamy till. Permeability is moderately rapid in the sandy part of the profile and moderate in the loamy lower part. Slopes range from 1 to 18 percent.

Typical pedon of Escanaba loamy fine sand, 1 to 6 percent slopes; 1,400 feet north and 2,300 feet east of the southwest corner of sec. 31, T. 45 N., R. 27 W.; USGS Green Hills topographic quadrangle; lat. 46 degrees 15 minutes 03 seconds N. and long. 87 degrees 43 minutes 59 seconds W.

Oe—0 to 1 inch; partially decomposed leaf litter.

A—1 to 3 inches; black (5YR 2.5/1) loamy fine sand, dark gray (5YR 4/1) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 3 percent gravel; moderately acid; abrupt wavy boundary.

E—3 to 6 inches; reddish gray (5YR 5/2) loamy fine sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 3 percent gravel; moderately acid; abrupt wavy boundary.

Bs1—6 to 12 inches; dark reddish brown (5YR 3/4) loamy fine sand; weak fine subangular blocky structure; very friable; many very fine to medium roots; about 3 percent gravel; moderately acid; clear wavy boundary.

Bs2—12 to 26 inches; brown (7.5YR 4/4) loamy fine sand; weak fine subangular blocky structure; very friable; few fine and medium roots; moderately acid; clear wavy boundary.

2E/B—26 to 35 inches; about 60 percent reddish brown (5YR 5/3) loamy fine sand, pinkish gray (5YR 6/2) dry (E); occurs as tongues extending into or completely surrounding isolated remnants of dark reddish brown (5YR 3/4) fine sandy loam (Bt); few distinct discontinuous dark reddish brown (5YR 3/3) clay films on faces of peds; weak medium subangular blocky structure; friable; few fine and medium roots; common very fine vesicular pores; about 3 percent gravel and 2 percent cobbles; neutral; clear irregular boundary.

2Bt—35 to 42 inches; dark reddish brown (5YR 3/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; few distinct discontinuous dark reddish brown (5YR 3/3) clay films on faces of peds; common very fine vesicular pores; about 3 percent gravel and 2 percent cobbles; neutral; gradual wavy boundary.

2C—42 to 80 inches; reddish brown (5YR 5/4) gravelly fine sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; few fine and medium roots; about 14 percent gravel and 6 percent cobbles; slightly effervescent; slightly alkaline.

The thickness of the sandy mantle ranges from 20 to 35 inches. The content of gravel ranges from 0 to 10 percent in the sandy mantle and the lower part of the subsoil and from 5 to 20 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the sandy mantle and the lower part of the subsoil and from 0 to 10 percent in the substratum.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly loamy fine sand, but the range includes fine sand, sand, and loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is loamy fine sand, fine sand, or sand.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loamy fine sand, fine sand, loamy sand, or sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy fine sand, fine sand, loamy sand, or sand.

The E part of the 2E/B horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is loamy sand or loamy fine sand. The B part of the 2E/B horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is sandy loam or fine sandy loam. Some pedons have a 2B/E horizon.

The 2Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The 2C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam.

Evart Series

The Evart series consists of very deep, poorly drained, rapidly permeable soils on flood plains and in old stream channels. These soils formed in silty and sandy alluvium. Slopes range from 0 to 2 percent.

Typical pedon of Evart silt loam, in an area of Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes; 1,750 feet east and 1,550 feet south of the northwest corner of sec. 28, T. 44 N., R. 26 W.; 35 feet south of the West Branch of the Escanaba River; USGS Northland NE topographic quadrangle; lat. 46 degrees 11 minutes 02 seconds N. and long. 87 degrees 34 minutes 33 seconds W.

A1—0 to 10 inches; very dark brown (10YR 2/2) silt loam, brown (10YR 4/3) dry; weak fine granular structure; friable; many very fine to coarse roots; common fine prominent red (2.5YR 5/8) masses of iron accumulation; neutral; clear wavy boundary.

A2—10 to 18 inches; black (10YR 2/1) loamy fine sand, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure; friable; few very fine to medium roots; few fine prominent red (2.5YR 5/8) masses of iron accumulation; slightly acid; clear wavy boundary.

Cg1—18 to 40 inches; grayish brown (10YR 5/2) sand; single grain; loose; few thin bands of very dark brown (10YR 2/2), well decomposed organic material; neutral; clear wavy boundary.

Cg2—40 to 80 inches; grayish brown (10YR 5/2) sand; single grain; loose; few thin bands of very dark brown (10YR 2/2), well decomposed organic material; about 6 percent gravel; slightly alkaline.

The thickness of the silty mantle ranges from 6 to 15 inches. The content of gravel ranges from 0 to 2 percent in the silty mantle and from 0 to 10 percent in the sandy lower part of the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 3. It is sand, fine sand, or loamy sand. In some pedons it has thin strata of silt loam.

Farquar Series

The Farquar series consists of very deep, moderately well drained soils on outwash terraces and outwash plains. These soils formed in gravelly and sandy outwash. Permeability is moderately rapid in the loamy mantle and very rapid in the sandy and gravelly outwash. Slopes range from 0 to 4 percent.

Typical pedon of Farquar gravelly sandy loam, 0 to 4 percent slopes; 990 feet east and 1,650 feet south of the northwest corner of sec. 16, T. 45 N., R. 25 W.; north of Gwinn; USGS Gwinn topographic quadrangle; lat. 46 degrees 17 minutes 58 seconds N. and long. 87 degrees 26 minutes 46 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed leaf litter; moderate very fine granular structure; very friable; many very fine to coarse roots; moderately acid; abrupt smooth boundary.

A—2 to 4 inches; black (10YR 2/1) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; moderate very fine granular structure; friable; many very fine to coarse roots; about 18 percent gravel and 1 percent cobbles; strongly acid; clear wavy boundary.

E—4 to 6 inches; brown (7.5YR 4/2) gravelly sandy loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 18 percent gravel and 1 percent cobbles; moderately acid; abrupt broken boundary.

2Bs1—6 to 9 inches; dark reddish brown (5YR 3/4) very gravelly loamy sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 45 percent gravel and 3 percent cobbles; moderately acid; clear irregular boundary.

2Bs2—9 to 20 inches; reddish brown (5YR 4/4) very gravelly coarse sand; weak very fine subangular blocky structure; very friable; common very fine to coarse roots; about 45 percent gravel and 3 percent cobbles; moderately acid; gradual wavy boundary.

2BC—20 to 36 inches; strong brown (7.5YR 4/6) very gravelly coarse sand; single grain; loose; common medium faint strong brown (7.5YR 5/8) masses of iron accumulation; about 45 percent gravel and 3 percent cobbles; moderately acid; gradual smooth boundary.

2C—36 to 80 inches; light brown (7.5YR 6/4), stratified very gravelly coarse sand and sand; single grain; loose; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 40 percent gravel and 3 percent cobbles; slightly acid.

The thickness of the loamy mantle ranges from 0 to 10 inches. The content of gravel ranges from 5 to 35 percent in the loamy material and from 15 to 60 percent in the lower part of the solum and in the substratum. The content of cobbles ranges from 0 to 15 percent throughout the profile, and the content of stones ranges from 0 to 2 percent throughout the profile. The content of rock fragments averages more than 35 percent in the control section.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is dominantly gravelly sandy loam, but the range includes fine sandy loam, loamy sand, gravelly fine sandy loam, and gravelly loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. It is sandy loam, fine sandy loam, or loamy sand or the gravelly analogs of these textures.

The 2Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is the very gravelly or extremely gravelly analogs of loamy sand, loamy coarse sand, coarse sand, or sand.

The 2Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of coarse sand, sand, loamy coarse sand, or loamy sand.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is the very gravelly or extremely gravelly analogs of coarse sand or sand.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. It is stratified sand or coarse sand or the gravelly or very gravelly analogs of these textures.

Fence Series

The Fence series consists of very deep, moderately well drained soils on till-floored lake plains. These soils formed in stratified loamy glaciolacustrine deposits. Permeability is moderate in the solum and moderately slow in the substratum. Slopes range from 1 to 12 percent.

Typical pedon of Fence very fine sandy loam, 1 to 12 percent slopes, dissected; 1,150 feet west and 500 feet south of the northeast corner of sec. 26, T. 46 N., R. 24

W.; USGS Little Lake topographic quadrangle; lat. 46 degrees 21 minutes 37 seconds N. and long. 87 degrees 16 minutes 01 second W.

A—0 to 3 inches; very dark gray (5YR 3/1) very fine sandy loam, gray (5YR 5/1) dry; weak medium subangular blocky structure; friable; many very fine to coarse roots; strongly acid; abrupt smooth boundary.

E—3 to 7 inches; reddish gray (5YR 5/2) very fine sandy loam, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; common very fine to coarse roots; moderately acid; abrupt wavy boundary.

Bhs—7 to 11 inches; dark reddish brown (5YR 3/2) very fine sandy loam; moderate medium subangular blocky structure; friable; many very fine to medium roots; about 1 percent gravel; moderately acid; clear wavy boundary.

Bs—11 to 16 inches; reddish brown (5YR 4/4) very fine sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; about 1 percent gravel; moderately acid; clear wavy boundary.

Bw—16 to 19 inches; yellowish brown (10YR 5/4) loamy very fine sand; weak thick platy structure parting to weak fine subangular blocky; very friable; few very fine to medium roots; about 1 percent gravel; moderately acid; clear wavy boundary.

B/E—19 to 42 inches; reddish brown (2.5YR 4/4) and red (2.5YR 4/6) silt loam (Bt); common distinct reddish brown (2.5YR 4/4) clay films on faces of peds; occupies about 60 percent of the horizon; penetrated by tongues of reddish brown (5YR 5/3) very fine sandy loam, pinkish gray (5YR 7/2) dry (E); moderate very thick platy structure parting to moderate medium subangular blocky; friable; few very fine to medium roots; common fine prominent strong brown (7.5YR 5/6 and 4/6) masses of iron accumulation; about 1 percent gravel; moderately acid; clear irregular boundary.

C1—42 to 57 inches; stratified reddish brown (2.5YR 4/4) silt loam, reddish brown (5YR 5/4) very fine sandy loam, and red (2.5YR 4/6) silty clay loam; massive with strong thick platiness inherent from deposition; friable; few very fine to medium roots; common fine prominent strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; clear wavy boundary.

C2—57 to 80 inches; stratified reddish brown (5YR 5/4) silt loam and brown (7.5YR 5/3) very fine sand; massive with weak very thick platiness inherent from deposition; friable; few fine distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/4) masses of iron accumulation; moderately acid.

The content of gravel ranges from 0 to 2 percent throughout the profile.

The A horizon has hue of 5YR, value of 2.5 or 3, and chroma of 1 or 2. It is very fine sandy loam.

The E horizon has hue of 5YR, value of 5 or 6, and chroma of 2 or 3. It is very fine sandy loam or silt loam.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is very fine sandy loam or silt loam.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is very fine sandy loam or silt loam.

The Bw horizon has hue of 10YR and value and chroma of 4 to 6. It is loamy very fine sand or very fine sandy loam.

The B part of the E/B and B/E horizons has hue of 2.5YR or 5YR, value of 4, and chroma of 3 to 6. It is silt loam. Some pedons have strata of silty clay loam. The E part has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is silt loam or very fine sandy loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is stratified very fine sandy loam, silt loam, silty clay loam, and very fine sand.

Finch Series

The Finch series consists of very deep, somewhat poorly drained soils on outwash plains and till-floored lake plains. These soils formed in sandy glaciolacustrine deposits and outwash. They have ortstein in the subsoil. Permeability is rapid in the upper part, moderate or moderately rapid in the ortstein, and rapid in the lower part. Slopes range from 0 to 5 percent.

Typical pedon of Finch sand, in an area of Paquin-Finch sands, 0 to 5 percent slopes; 2,063 feet south and 196 feet east of the northwest corner of sec. 1, T. 49 N., R. 27 W.; USGS Negaunee NW topographic quadrangle; lat. 46 degrees 40 minutes 24 seconds N. and long. 87 degrees 38 minutes 01 second W.

Oa—0 to 3 inches; black (N 2.5/0), well decomposed forest litter; many very fine to coarse roots; about 2 percent gravel; very strongly acid; abrupt smooth boundary.

E—3 to 10 inches; brown (7.5YR 5/2) sand, gray (7.5YR 6/1) dry; weak very fine subangular blocky structure; very friable; many medium distinct dark reddish gray (5YR 4/2) iron depletions; many very fine to coarse roots; about 2 percent gravel; very strongly acid; abrupt irregular boundary.

Bhsm—10 to 12 inches; dark brown (7.5YR 3/3) and dark reddish brown (5YR 3/2) sand; massive; very hard; few very fine and fine roots in cracks; strongly cemented ortstein occupies 90 percent (36 of 40 inches) of the horizon and extends into the Bsm horizon; ortstein exists as a nearly continuous layer; common medium distinct very dark gray (5YR 3/1) iron depletions; common medium distinct strong brown (7.5YR 4/6) masses of iron accumulation; about 2 percent gravel; very strongly acid; gradual irregular boundary.

Bsm—12 to 20 inches; dark brown (7.5YR 3/4) sand; massive; very hard; few very fine and fine roots in cracks; strongly cemented ortstein occupies 100 percent of the horizon; tongues of ortstein extend to a depth of 24 inches; many moderate distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 2 percent gravel; strongly acid; gradual wavy boundary.

BC—20 to 29 inches; brown (7.5YR 4/4) sand; massive; friable; few very fine and fine roots; common medium distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 2 percent gravel; moderately acid; gradual wavy boundary.

C—29 to 80 inches; brown (7.5YR 4/3) sand; single grain; loose; common coarse distinct strong brown (7.5YR 4/6) masses of iron accumulation; about 2 percent gravel; moderately acid.

The depth to ortstein ranges from 7 to 12 inches. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon, if it occurs, has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is sand or loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is sand or loamy sand.

The Bhsm horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 2 or 3. It is sand.

The Bsm horizon, if it occurs, has hue of 2.5YR, 5YR, or 7.5YR, value of 3 or 4, and chroma of 3 to 6. Value and chroma of 3 do not occur together. This horizon is sand.

The Bs horizon, if it occurs, has hue of 5YR or 7.5YR and value and chroma of 3 or 4. Value and chroma of 3 do not occur together. This horizon is sand.

The BC horizon has hue of 7.5YR, value of 4, and chroma of 3. It is sand.

The C horizon has hue of 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is sand.

Frohling Series

The Frohling series consists of very deep, well drained soils on till-floored lake plains, dissected moraines, and ground moraines. These soils are shallow or moderately deep to a fragipan. They formed in loamy till. Permeability is moderate in the upper part of the profile and very slow in the fragipan. Slopes range from 8 to 70 percent.

Typical pedon of Frohling fine sandy loam, in an area of Frohling-Tokiahok complex, 8 to 35 percent slopes, dissected, very stony; 600 feet north and 2,150 feet west of the southeast corner of sec. 12, T. 45 N., R. 24 W.; USGS Carlshend topographic quadrangle; lat. 46 degrees 18 minutes 28 seconds N. and long. 87 degrees 14 minutes 58 seconds W.

Oe—0 to 1 inch; black (10YR 2/1), partially decomposed forest litter.

A—1 to 2 inches; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 5 percent cobbles and 3 percent gravel; strongly acid; abrupt smooth boundary.

E—2 to 7 inches; reddish gray (5YR 5/2) fine sandy loam, light gray (5YR 7/1) dry; weak thin platy structure parting to weak very fine subangular blocky; friable; many very fine to coarse roots; about 5 percent cobbles and 3 percent gravel; strongly acid; abrupt wavy boundary.

Bhs—7 to 9 inches; dark reddish brown (5YR 3/3) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 5 percent cobbles and 3 percent gravel; strongly acid; abrupt broken boundary.

Bs—9 to 16 inches; reddish brown (5YR 4/4) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 5 percent cobbles and 3 percent gravel; strongly acid; clear wavy boundary.

(E/B)x—16 to 34 inches; about 70 percent reddish brown (5YR 5/3) loamy fine sand, light gray (5YR 7/1) dry (E); surrounding peds of reddish brown (5YR 4/4) fine sandy loam (Bt); common distinct red (2.5YR 4/6) clay films on faces of peds and in root channels; weak thin platy structure parting to weak very fine subangular blocky; very firm; few very fine to medium roots in cracks 12 to 24 inches apart; common very fine vesicular pores; about 5 percent cobbles and 3 percent gravel; moderately acid; gradual irregular boundary.

(B/E)x—34 to 80 inches; reddish brown (2.5YR 4/4) fine sandy loam (Bt); common distinct red (2.5YR 4/6) clay films on faces of peds and in root channels; occupies about 60 percent of the horizon; surrounding peds of reddish brown (2.5YR 5/3) loamy fine sand, light gray (5YR 7/1) dry (E); weak medium platy structure parting to weak fine subangular blocky; very firm; few very fine to medium roots in cracks 12 to 24 inches apart; common very fine vesicular pores; about 5 percent cobbles and 3 percent gravel; strongly acid.

Depth to the fragipan ranges from 15 to 25 inches. The content of gravel ranges from 0 to 15 percent throughout the profile, and the content of cobbles ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is dominantly fine sandy loam, but the range includes sandy loam and loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. It is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is fine sandy loam or sandy loam.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 to 6. It is fine sandy loam or sandy loam.

The E part of the (E/B)x and (B/E)x horizons has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4. It is loamy sand, loamy fine sand, sandy loam, or fine sandy

loam. The Bt part of the (E/B)x and (B/E)x horizons has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. It is fine sandy loam or sandy loam.

The C horizon, if it occurs, has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam or sandy loam.

Garlic Series

The Garlic series consists of very deep, well drained, rapidly permeable soils on till-floored lake plains and dissected moraines. These soils formed in sandy glaciofluvial sediments. Slopes range from 1 to 70 percent.

Typical pedon of Garlic fine sand (fig. 19), in an area of Garlic-Alcona-Voelker complex, 15 to 70 percent slopes, dissected; 2,000 feet west and 1,350 feet north of the southeast corner of sec. 6, T. 46 N., R. 24 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 24 minutes 32.50 seconds N. and long. 87 degrees 21 minutes 13.18 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed leaf litter; moderate fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—1 to 9 inches; reddish gray (5YR 5/2) fine sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; very strongly acid; clear wavy boundary.

Bhs—9 to 15 inches; dark reddish brown (5YR 3/2) fine sand; weak medium subangular blocky structure; friable; many very fine to coarse roots; dark reddish brown (5YR 3/2), moderately cemented ortstein occupies 28 percent (11 of 40 inches) of the lower part of the horizon; the ortstein extends into the Bs horizon; very strongly acid; clear wavy boundary.

Bs—15 to 26 inches; dark reddish brown (5YR 3/4) fine sand; weak medium subangular blocky structure; friable; common very fine to coarse roots; dark reddish brown (5YR 3/3) and reddish brown (5YR 4/4), strongly cemented ortstein occupies 75 percent (30 of 40 inches) of the horizon; the ortstein extends from the Bhs horizon into this horizon to a depth of 47 inches and occurs as tongues 10 to 30 inches apart; moderately acid; clear wavy boundary.

BC—26 to 46 inches; brown (7.5YR 5/4) fine sand; weak fine subangular blocky structure; friable; few very fine to medium roots; few thin strata of reddish brown (5YR 4/4) loamy fine sand; moderate cementation in the upper part of the horizon; strongly acid; gradual wavy boundary.

C—46 to 80 inches; brown (7.5YR 5/4) fine sand; single grain; loose; slightly acid.

The content of gravel ranges from 0 to 5 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is dominantly fine sand, but the range includes loamy fine sand and sand.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand, fine sand, or loamy fine sand.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is fine sand or sand.

The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sand or sand.

The BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sand or sand and has thin strata of loamy fine sand.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is fine sand or sand and has thin strata of loamy fine sand.

Figure 19.—Typical profile of Garlic fine sand. Garlic soils support good stands of hardwood. Depth is marked in feet.

Gay Series

The Gay series consists of very deep, poorly drained, moderately permeable soils in depressions and drainageways on till-floored lake plains and ground moraines. These soils formed in loamy till. Slopes are 0 to 1 percent.

Typical pedon of Gay muck, stony; 2,300 feet west and 2,100 feet south of the northeast corner of sec. 33, T. 51 N., R. 26 W.; USGS Granite Point topographic quadrangle; lat. 46 degrees 46 minutes 28 seconds N. and long. 87 degrees 36 minutes 38 seconds W.

Oa—0 to 2 inches; black (10YR 2/1) muck; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

A—2 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many very fine to coarse roots; about 5 percent gravel; very strongly acid; clear wavy boundary.

Eg—5 to 18 inches; brown (7.5YR 5/2) loamy sand, brown (10YR 5/3) dry; moderate coarse subangular blocky structure; friable; few very fine to medium roots; common medium prominent yellowish red (5YR 4/6 and 5/6) masses of iron accumulation; about 5 percent gravel; strongly acid; clear wavy boundary.

Bw—18 to 31 inches; reddish brown (5YR 5/3 and 5/4) sandy loam; moderate thick platy structure; friable; very few fine roots; common medium distinct yellowish red (5YR 4/6 and 5/6) masses of iron accumulation; about 8 percent gravel and 2 percent cobbles; strongly acid; gradual wavy boundary.

C—31 to 80 inches; reddish brown (2.5YR 4/4) sandy loam; massive with weakly expressed thick platiness inherent from deposition; friable; about 8 percent gravel and 2 percent cobbles; moderately acid.

The content of gravel ranges from 0 to 15 percent in the A and E horizons and from 0 to 10 percent in the rest of the profile. The content of cobbles ranges from 0 to 10 percent throughout the profile, and the content of stones ranges from 0 to 5 percent throughout the profile.

The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 2.5 and chroma of 0 or 1.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly fine sandy loam, but the range includes sandy loam and loam or the gravelly or cobbly analogs of these textures.

The Eg horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. It is loamy sand, fine sandy loam, or sandy loam or the gravelly or cobbly analogs of these textures.

The Bw horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam. Some pedons have a BC horizon.

Gogebic Series

The Gogebic series consists of very deep, moderately well drained soils on bedrock-controlled moraines. These soils are shallow or moderately deep to a fragipan. They formed in a silty or loamy mantle over loamy till. Permeability is moderate in the upper part of the profile, very slow in the fragipan, and moderate in the substratum. Slopes range from 1 to 18 percent.

Typical pedon of Gogebic cobbly silt loam, 1 to 6 percent slopes, very stony; 350 feet west and 2,500 feet north of the southeast corner of sec. 19, T. 47 N., R. 27 W.; USGS Ishpeming topographic quadrangle; lat. 46 degrees 27 minutes 24 seconds N. and long. 87 degrees 43 minutes 12 seconds W.

Oe—0 to 1 inch; black (7.5YR 2.5/1), partially decomposed forest litter; many very fine to coarse roots; about 9 percent cobbles, 5 percent stones, and 2 percent gravel; strongly acid; abrupt smooth boundary.

A—1 to 3 inches; black (5YR 2.5/1) cobbly silt loam, gray (5YR 6/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 9 percent cobbles, 6 percent gravel, and 5 percent stones; extremely acid; clear wavy boundary.

E—3 to 5 inches; reddish gray (5YR 5/2) cobbly silt loam, pinkish gray (7.5YR 6/2) dry; moderate fine subangular blocky structure; friable; many very fine to coarse roots;

about 9 percent cobbles, 6 percent gravel, and 5 percent stones; extremely acid; abrupt broken boundary.

Bs1—5 to 13 inches; dark reddish brown (5YR 3/4) cobbly fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 9 percent cobbles, 6 percent gravel, and 5 percent stones; extremely acid; clear wavy boundary.

Bs2—13 to 18 inches; reddish brown (5YR 4/4) cobbly sandy loam; weak fine subangular blocky structure; firm; common very fine to coarse roots; about 9 percent cobbles, 6 percent gravel, and 5 percent stones; very strongly acid; clear smooth boundary.

2(E/B)x—18 to 34 inches; about 60 percent reddish brown (2.5YR 5/3) very gravelly loamy sand, light reddish brown (5YR 6/3) dry (E); surrounding isolated remnants of reddish brown (2.5YR 4/4) very gravelly sandy loam (Bt); common distinct red (2.5YR 5/8) clay films on faces of peds; weak medium platy structure; very firm; few very fine to medium roots in cracks 10 to 20 inches apart; many very fine and fine vesicular pores; common medium distinct red (2.5YR 5/8) masses of iron accumulation; about 30 percent gravel, 15 percent cobbles, and 10 percent stones; strongly acid; gradual irregular boundary.

2(B/E)x—34 to 62 inches; reddish brown (2.5YR 4/4) very gravelly sandy loam (Bt); common distinct red (2.5YR 5/8) clay films on faces of peds; occupies about 70 percent of the horizon; surrounded by reddish brown (2.5YR 5/3) very gravelly loamy sand, light reddish brown (5YR 6/3) dry (E); weak medium platy structure; very firm; few very fine and fine roots in cracks 10 to 20 inches apart; common very fine vesicular pores; about 30 percent gravel, 8 percent cobbles, and 5 percent stones; moderately acid; gradual irregular boundary.

2C—62 to 80 inches; reddish brown (2.5YR 4/4) very gravelly sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; about 30 percent gravel, 8 percent cobbles, and 5 percent stones; strongly acid.

Depth to the fragipan ranges from 15 to 30 inches. The content of gravel ranges from 5 to 15 percent above the fragipan and from 20 to 30 percent in the fragipan and in the substratum. The content of cobbles ranges from 1 to 15 percent above the fragipan and from 5 to 20 percent in the fragipan and in the substratum. The content of stones ranges from 0 to 10 percent throughout the profile.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly cobbly silt loam, but the range includes cobbly very fine sandy loam, cobbly fine sandy loam, very fine sandy loam, and fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR and value and chroma of 4. It is fine sandy loam, sandy loam, cobbly fine sandy loam, or cobbly sandy loam.

The B part of the 2(B/E)x and 2(E/B)x horizons has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 6. It is very gravelly sandy loam or very cobbly sandy loam or the gravelly or cobbly analogs of these textures. The E part of the 2(B/E)x and 2(E/B)x horizons has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 or 3. It is very gravelly loamy sand, very cobbly loamy sand, gravelly loamy sand, or cobbly loamy sand.

The 2C horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 4 to 6. It is very gravelly sandy loam or gravelly sandy loam.

Goodman Series

The Goodman series consists of very deep, well drained soils on disintegration moraines. These soils formed in a silty mantle over sandy till. Permeability is moderate in the silty mantle and moderately rapid in the substratum. Slopes range from 1 to 45 percent.

Typical pedon of Goodman silt loam, in an area of Goodman-Sundog silt loams, 18 to 45 percent slopes, bouldery; 1,800 feet east and 650 feet south of the northwest corner of sec. 36, T. 45 N., R. 30 W.; USGS Witch Lake topographic quadrangle; lat. 46 degrees 15 minutes 34 seconds N. and long. 88 degrees 00 minutes 21 seconds W.

Oe—0 to 1 inch; black (7.5YR 2.5/1), partially decomposed forest litter; strongly acid; abrupt smooth boundary.

E—1 to 4 inches; pinkish gray (5YR 6/2) silt loam, pinkish gray (7.5YR 7/2) dry; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 1 percent gravel; strongly acid; abrupt smooth boundary.

Bs1—4 to 11 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 1 percent gravel; moderately acid; clear wavy boundary.

Bs2—11 to 19 inches; strong brown (7.5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 1 percent gravel; moderately acid; clear wavy boundary.

E/B—19 to 30 inches; about 85 percent brown (7.5YR 5/3) silt loam, pinkish gray (7.5YR 6/2) dry (E); surrounding isolated remnants of reddish brown (5YR 4/4) silt loam (Bt); few distinct dark reddish brown (5YR 3/3) clay films on faces of peds; weak fine subangular blocky structure; friable; common very fine to medium roots; about 1 percent gravel; slightly acid; clear wavy boundary.

2B/E—30 to 51 inches; dark reddish brown (5YR 3/4) sandy loam (Bt); common distinct dark reddish brown (5YR 3/3) clay films on faces of peds; occupies about 75 percent of the horizon; penetrated by tongues of reddish brown (5YR 4/3) loamy sand, light reddish brown (5YR 6/3) dry (E); weak medium platy structure parting to weak very fine subangular blocky; friable; common very fine to medium roots; about 4 percent gravel and 2 percent cobbles; slightly acid; gradual irregular boundary.

2E/B—51 to 71 inches; about 85 percent reddish brown (5YR 4/3) loamy sand, light reddish brown (5YR 6/3) dry (E); surrounding isolated remnants of dark reddish brown (5YR 3/4) sandy loam (Bt); few distinct dark reddish brown (5YR 3/3) clay films on faces of peds; weak medium platy structure parting to weak very fine subangular blocky; friable; few very fine and fine roots; about 4 percent gravel and 2 percent cobbles; slightly acid; gradual wavy boundary.

2C—71 to 80 inches; brown (7.5YR 4/4) loamy sand; massive with weakly expressed thick plates inherited from the parent material; friable; few very fine and fine roots; about 4 percent gravel and 2 percent cobbles; slightly acid.

The thickness of the silty mantle ranges from 12 to 36 inches. The content of gravel ranges from 3 to 5 percent in the silty mantle and from 3 to 20 percent in the underlying till. The content of cobbles ranges from 0 to 3 percent in the silty mantle and from 0 to 5 percent in the underlying till. The content of stones ranges from 0 to 3 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is dominantly silt loam, but the range includes very fine sandy loam. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is silt loam or very fine sandy loam.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or very fine sandy loam.

The E part of the E/B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. It is very fine sandy loam or silt loam. The Bt part of the E/B horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is silt loam or very fine sandy loam.

The 2(B/E) and 2(E/B) horizons have colors similar to those of the E/B horizon. The E part is loamy sand, sandy loam, gravelly loamy sand, or gravelly sandy loam. The Bt part is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam.

The 2C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand, sandy loam, or fine sandy loam or the gravelly analogs of these textures.

Grayling Series

The Grayling series consists of very deep, excessively drained, rapidly permeable soils on outwash plains. These soils formed in sandy outwash. Slopes range from 0 to 35 percent.

Typical pedon of Grayling sand, 0 to 6 percent slopes; 1,000 feet north and 1,200 feet west of the southeast corner of sec. 31, T. 47 N., R. 25 W.; USGS Sands topographic quadrangle; lat. 46 degrees 25 minutes 22 seconds N. and long. 87 degrees 28 minutes 26 seconds W.

A—0 to 3 inches; very dark gray (10YR 3/1) sand, dark gray (10YR 4/1) dry; mixed with coated and uncoated sand grains; weak very fine granular structure; very friable; many very fine to coarse roots; about 2 percent gravel; very strongly acid; abrupt smooth boundary.

Bw1—3 to 11 inches; brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel; moderately acid; gradual wavy boundary.

Bw2—11 to 23 inches; strong brown (7.5YR 4/6) sand; weak fine subangular blocky structure; very friable; common very fine to medium roots; about 2 percent gravel; moderately acid; gradual wavy boundary.

C—23 to 80 inches; light brown (7.5YR 6/4) sand; single grain; loose; few very fine and fine roots; about 2 percent gravel; slightly acid.

The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand. It is typically intermixed with E horizon material. Some pedons have a separate E horizon.

The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand. Some pedons have a BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is sand.

Greenwood Series

The Greenwood series consists of very deep, very poorly drained soils in depressions on outwash plains, till-floored lake plains, and moraines. These soils formed in deep organic deposits. Permeability is moderate or moderately rapid. Slopes are 0 to 1 percent.

Typical pedon of Greenwood peat, in an area of Greenwood and Dawson soils; in the Sand River area; 2,300 feet south and 1,900 feet east of the northwest corner of sec. 12, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 30 minutes 13 seconds N. and long. 87 degrees 08 minutes 16 seconds W.

Oi—0 to 8 inches; peat, dark brown (10YR 3/3) broken face and brown (10YR 4/3) rubbed; massive; many very fine to coarse roots; about 99 percent fiber, 95 percent rubbed; extremely acid; clear smooth boundary.
Oa—8 to 11 inches; muck, black (10YR 2/1) broken face and rubbed; massive; few very fine to medium roots; about 50 percent fiber, 10 percent rubbed; extremely acid; gradual smooth boundary.
Oe1—11 to 65 inches; mucky peat, very dark brown (10YR 2/2) broken face and rubbed; massive; few fine roots; about 80 percent fiber, 30 percent rubbed; extremely acid; gradual smooth boundary.
Oe2—65 to 80 inches; mucky peat, dark brown (7.5YR 3/3) broken face and rubbed; massive; few fine roots; about 95 percent fiber, 40 percent rubbed; extremely acid.

The organic layers are more than 51 inches thick. These soils are primarily herbaceous.

The surface tier has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 or 4. It is dominantly fibric material derived from sphagnum moss.

The subsurface and bottom tiers have hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 4. They are dominantly mucky peat, but some pedons have a layer of muck or peat less than 10 inches thick.

Ishpeming Series

The Ishpeming series consists of somewhat excessively drained, rapidly permeable soils that are moderately deep to bedrock. These soils are on bedrock-controlled moraines, outwash terraces, and outwash plains. They formed in sandy drift overlying igneous and metamorphic bedrock. Slopes range from 6 to 70 percent.

Typical pedon of Ishpeming sand, in an area of Ishpeming-Rock outcrop complex, 6 to 25 percent slopes, very bouldery; near Gwinn; 601 feet east and 1,802 feet south of the northwest corner of sec. 16, T. 45 N., R. 25 W.; USGS Gwinn topographic quadrangle; lat. 46 degrees 17 minutes 56 seconds N. and long. 87 degrees 26 minutes 51 seconds W.

Oe—0 to 2 inches; black (N 2.5/0), partially decomposed forest litter; very strongly acid; abrupt smooth boundary.
E—2 to 6 inches; brown (7.5YR 5/2) sand, pinkish gray (7.5YR 6/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt irregular boundary.
Bs1—6 to 7 inches; dark brown (7.5YR 3/4) sand; weak fine granular structure; very friable; common very fine to medium roots; discontinuous tongues of dark brown (7.5YR 3/4), moderately cemented ortstein occupy 40 percent (16 of 40 inches) of the horizon; tongues are 4 to 10 inches wide and 5 to 18 inches apart and extend to a depth of 16 inches; about 2 percent gravel; strongly acid; clear irregular boundary.
Bs2—7 to 13 inches; brown (7.5YR 4/4) sand; single grain; loose; common very fine to medium roots; discontinuous tongues of dark brown (7.5YR 3/4), moderately cemented ortstein extend into this horizon from the Bs1 horizon and occupy 10 percent (4 of 40 inches) of the horizon; strongly acid; about 2 percent gravel; gradual irregular boundary.
BC—13 to 24 inches; strong brown (7.5YR 4/6) sand; single grain; loose; common very fine to medium roots; about 2 percent gravel; moderately acid; clear smooth boundary.
C—24 to 38 inches; brown (7.5YR 4/4) loamy fine sand; moderate fine subangular blocky structure; friable; common fine roots; about 8 percent cobbles and 5 percent gravel; moderately acid; abrupt smooth boundary.
2R—38 inches; granite bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 15 percent throughout the profile, and the content of cobbles ranges from 0 to 10 percent throughout the profile. The total content of rock fragments is less than 15 percent in the solum.

The A horizon, if it occurs, has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand, fine sand, loamy sand, or loamy fine sand.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3. It is dominantly sand, but the range includes loamy sand, fine sand, and loamy fine sand.

The Bs1 horizon has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 4. It is sand, fine sand, loamy sand, or loamy fine sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand, fine sand, loamy sand, or loamy fine sand.

The BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand, fine sand, loamy sand, or loamy fine sand.

The C horizon has hue of 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is loamy sand or loamy fine sand or the gravelly or cobbly analogs of these textures.

The underlying bedrock is igneous or metamorphic.

Jacobsville Series

The Jacobsville series consists of poorly drained, moderately permeable soils that are moderately deep to bedrock. These soils are in depressions on sandstone benches. They formed in loamy till overlying acidic sandstone bedrock. Slopes are 0 to 1 percent.

Typical pedon of Jacobsville muck, very stony, 700 feet west and 2,950 feet north of the southeast corner of sec. 32, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 25 minutes 42.87 seconds N. and long. 87 degrees 12 minutes 12.43 seconds W.

Oa—0 to 4 inches; black (N 2.5/0) muck; moderate very fine granular structure; very friable; many very fine to coarse roots; strongly acid; clear wavy boundary.

Eg—4 to 9 inches; dark gray (10YR 4/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure; friable; few very fine to medium roots; common distinct black (10YR 2/1) coatings of mucky loam along root channels; common brownish yellow (10YR 6/8) fragments of weathered sandstone; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 8 percent cobbles and 4 percent gravel; strongly acid; clear broken boundary.

Bw—9 to 16 inches; reddish brown (2.5YR 4/3) sandy loam; weak medium subangular blocky structure; friable; few very fine to medium roots; common brownish yellow (10YR 6/8) fragments of weathered sandstone; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 4 percent cobbles and 4 percent gravel; slightly acid; gradual wavy boundary.

C—16 to 25 inches; reddish brown (2.5YR 4/3) sandy loam; massive with weak thick plates inherent from deposition; friable; common brownish yellow (10YR 6/8) fragments of weathered sandstone; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 4 percent gravel; moderately acid; abrupt broken boundary.

2Cr—25 to 28 inches; reddish brown (2.5YR 4/3), soft and weathered sandstone; moderately acid; abrupt smooth boundary.

2R—28 inches; reddish brown (2.5YR 4/3) sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 2 to 15 percent throughout the profile, the content of cobbles ranges from 0 to 10 percent throughout the profile, and the content of stones ranges from 0 to 5 throughout the profile.

The Oa horizon has hue of 5YR or 7.5YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The Eg horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1 or 2. It is loam, sandy loam, or fine sandy loam or the gravelly analogs of these textures. Some pedons have an A horizon.

The Bw horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. It is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam.

The C horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 3 or 4. It is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam.

The 2Cr horizon has hue of 2.5YR, value of 4, and chroma of 3 or 4.

The underlying bedrock is sandstone.

Jeske Series

The Jeske series consists of somewhat poorly drained, rapidly permeable soils that are shallow to bedrock. These soils are on sandstone benches. They formed in sandy deposits weathered from sandstone bedrock. Slopes range from 0 to 3 percent.

Typical pedon of Jeske sand, 0 to 3 percent slopes; 300 feet north and 200 feet east of the southwest corner of sec. 20, T. 46 N., R. 23 W.; USGS Carlshend topographic quadrangle; lat. 46 degrees 21 minutes 55 seconds N. and long. 87 degrees 12 minutes 28 seconds W.

Oe—0 to 1 inch; very dark gray (5YR 3/1), partially decomposed forest litter; weak thin platy structure; very friable; many very fine to coarse roots; very strongly acid; clear smooth boundary.

Oa—1 to 3 inches; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

C1—3 to 11 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few very fine to medium roots; strongly acid; clear smooth boundary.

C2—11 to 21 inches; very pale brown (10YR 8/2) sand; single grain; loose; moderately acid; abrupt smooth boundary.

2Cr—21 to 31 inches; dark reddish brown (5YR 3/2), weathered sandstone; massive; very firm; moderately acid; abrupt wavy boundary.

2R—31 inches; light gray (10YR 7/2) and strong brown (7.5YR 5/6) sandstone bedrock.

The depth to Cr material ranges from 10 to 20 inches, and the depth to bedrock ranges from 20 to 40 inches. Depths are from the mineral surface. The content of cobbles and gravel ranges from 0 to 5 percent throughout the profile.

The C horizon has hue of 7.5YR or 10YR, value of 6 to 8, and chroma of 2 or 3. It is sand or loamy sand.

The 2Cr horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 4. It is sand or loamy fine sand.

The underlying bedrock is sandstone.

Kalkaska Series

The Kalkaska series consists of very deep, somewhat excessively drained, rapidly permeable soils on outwash plains, till-floored lake plains, moraines, and outwash terraces. These soils formed in sandy outwash. Slopes range from 0 to 70 percent.

Typical pedon of Kalkaska sand, 0 to 6 percent slopes; 250 feet east and 1,000 feet north of the southwest corner of sec. 31, T. 47 N., R. 24 W.; USGS Harvey topographic

quadrangle; lat. 46 degrees 25 minutes 21 seconds N. and long. 87 degrees 21 minutes 51 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; many very fine to coarse roots; abrupt smooth boundary.

E—2 to 6 inches; reddish gray (5YR 5/2) sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel; extremely acid; clear wavy boundary.

Bhs—6 to 8 inches; dark reddish brown (5YR 3/2) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; dark reddish brown (5YR 3/2), moderately cemented ortstein occupies 15 percent (6 of 40 inches) of the horizon; the ortstein extends into the Bs horizon and occurs as discontinuous tongues; about 2 percent gravel; extremely acid; clear irregular boundary.

Bs—8 to 17 inches; reddish brown (5YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; dark reddish brown (5YR 3/3) and reddish brown (5YR 4/4), strongly cemented ortstein occupies 38 percent (15 of 40 inches) of the horizon; the ortstein extends from the Bhs horizon into this horizon to a depth of 43 inches and occurs as tongues 7 to 23 inches apart and 5 to 11 inches wide; about 2 percent gravel; very strongly acid; gradual irregular boundary.

BC—17 to 32 inches; strong brown (7.5YR 5/6) sand; weak very fine subangular blocky structure; very friable; few very fine and fine roots; about 2 percent gravel; strongly acid; gradual irregular boundary.

C—32 to 80 inches; brown (7.5YR 5/3) sand; single grain; loose; about 2 percent gravel; strongly acid.

The depth to ortstein ranges from 5 to 15 inches. The content of gravel ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum. The profile is sand throughout.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6.

Karlin Series

The Karlin series consists of very deep, somewhat excessively drained soils on disintegration moraines, outwash plains, and outwash terraces. These soils formed in a loamy mantle over sandy outwash. Permeability is moderately rapid in the loamy upper part and rapid in the sandy lower part. Slopes range from 1 to 18 percent.

Typical pedon of Karlin sandy loam, 1 to 6 percent slopes; 30 feet west and 2,200 feet north of the southeast corner of sec. 10, T. 45 N., R. 26 W.; USGS Cataract Basin topographic quadrangle; lat. 46 degrees 17 minutes 46 seconds N. and long. 87 degrees 33 minutes 13 seconds W.

Oa—0 to 1 inch; black (7.5YR 2.5/0), well decomposed forest litter; many very fine to coarse roots; about 2 percent gravel and 2 percent cobbles; very strongly acid; abrupt smooth boundary.

E—1 to 4 inches; brown (7.5YR 5/2) sandy loam, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel and 2 percent cobbles; very strongly acid; clear wavy boundary.

Bs1—4 to 7 inches; dark brown (7.5YR 3/4) sandy loam; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel and 2 percent cobbles; strongly acid; clear wavy boundary.

Bs2—7 to 15 inches; brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 2 percent gravel and 2 percent cobbles; strongly acid; clear smooth boundary.

2BC—15 to 29 inches; brown (7.5YR 5/4) sand; single grain; loose; few fine roots; about 4 percent gravel and 2 percent cobbles; moderately acid; clear smooth boundary.

2C—29 to 80 inches; yellowish brown (10YR 5/4) sand; single grain; loose; about 4 percent gravel and 2 percent cobbles; moderately acid.

The thickness of the loamy mantle ranges from 10 to 20 inches. The content of gravel ranges from 0 to 10 percent throughout the profile, and the content of cobbles ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is dominantly sandy loam, but the range includes fine sandy loam and loamy fine sand. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is sandy loam, fine sandy loam, or loamy fine sand.

The Bs2 horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam, fine sandy loam, or loamy fine sand.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sand or loamy sand.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sand.

Keewaydin Series

The Keewaydin series consists of very deep, well drained soils on bedrock-controlled moraines and disintegration moraines. These soils formed in loamy and silty eolian deposits overlying gravelly and sandy till. Permeability is moderate in the loamy upper part of the profile and moderately rapid or rapid in the lower part. Slopes range from 1 to 60 percent.

Typical pedon of Keewaydin cobbly fine sandy loam, in an area of Keewaydin-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very bouldery; 1,800 feet east and 2,200 feet south of the northwest corner of sec. 9, T. 48 N., R. 30 W.; 2.5 miles north of Lake Michigamme; USGS Michigamme topographic quadrangle; lat. 46 degrees 34 minutes 21 seconds N. and long. 88 degrees 04 minutes 03 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

E—2 to 4 inches; reddish brown (5YR 5/3) cobbly fine sandy loam, pinkish gray (5YR 6/2) dry; weak fine granular structure; friable; many very fine to coarse roots; 17 percent cobbles, 15 percent gravel, and 2 percent stones; extremely acid; abrupt smooth boundary.

Bs1—4 to 10 inches; dark reddish brown (5YR 3/4) fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; 11 percent gravel and 3 percent stones; very strongly acid; clear wavy boundary.

Bs2—10 to 20 inches; strong brown (7.5YR 4/6) cobbly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; 14 percent cobbles, 11 percent gravel, and 3 percent stones; very strongly acid; gradual wavy boundary.

2BC—20 to 31 inches; brown (7.5YR 5/4) gravelly loamy sand; weak fine subangular blocky structure; friable; common very fine to medium roots; 23 percent gravel and 10 percent stones; strongly acid; gradual wavy boundary.

2C—31 to 80 inches; brown (10YR 5/3) very cobbly loamy sand; massive; friable; firm in places; few very fine and fine roots; discontinuous silt coatings on gravel and cobble surfaces; clean sand grains; 25 percent gravel, 16 percent cobbles, and 5 percent stones; strongly acid.

The thickness of the loamy mantle ranges from 15 to 30 inches. The content of gravel ranges from 0 to 15 percent in the loamy mantle and from 5 to 50 percent in the sandy lower part of the profile. The content of cobbles ranges from 0 to 30 percent throughout the profile, and the content of stones ranges from 0 to 10 percent throughout the profile.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is fine sandy loam or silt loam or the cobbly or bouldery analogs of these textures.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. It is dominantly cobbly fine sandy loam, but the range includes fine sandy loam, silt loam, and cobbly silt loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam, silt loam, cobbly fine sandy loam, or cobbly silt loam.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sandy loam, silt loam, cobbly fine sandy loam, or cobbly silt loam.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is gravelly loamy sand, gravelly sand, cobbly loamy sand, or cobbly sand.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is very cobbly loamy sand or very cobbly sand or the cobbly, gravelly, or very gravelly analogs of these textures. In some pedons it has thin lenses of fine sandy loam or sandy loam.

Keweenaw Series

The Keweenaw series consists of very deep, well drained, moderately rapidly permeable soils on bedrock-controlled moraines, dissected moraines, disintegration moraines, and till-floored lake plains. These soils formed in sandy till. Slopes range from 1 to 70 percent.

Typical pedon of Keweenaw loamy sand, 18 to 35 percent slopes; 2,400 feet west and 1,400 feet north of the southeast corner of sec. 19, T. 48 N., R. 26 W.; USGS Negaunee topographic quadrangle; lat. 46 degrees 32 minutes 20 seconds N. and long. 87 degrees 36 minutes 12 seconds W.

A—0 to 1 inch; black (10YR 2/1) loamy sand, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 2 percent stones; strongly acid; abrupt wavy boundary.

E—1 to 3 inches; reddish brown (5YR 5/3) loamy sand, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 5 percent gravel, 2 percent cobbles, and 2 percent stones; strongly acid; clear wavy boundary.

Bs1—3 to 9 inches; dark reddish brown (5YR 3/4) loamy sand; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 5 percent gravel, 2 percent cobbles, and 2 percent stones; strongly acid; gradual wavy boundary.

Bs2—9 to 25 inches; reddish brown (5YR 4/4) loamy sand; moderate coarse subangular blocky structure; friable; common very fine to coarse roots; about 5

percent gravel, 2 percent cobbles, and 2 percent stones; strongly acid; gradual wavy boundary.

E/B—25 to 36 inches; about 60 percent light reddish brown (5YR 6/3) sand, pinkish gray (5YR 7/2) dry (E); surrounding reddish brown (5YR 4/4) loamy sand (Bt); common distinct clay bridging between sand grains; weak coarse subangular blocky structure; friable; common very fine to coarse roots; about 5 percent gravel and 2 percent cobbles; moderately acid; gradual wavy boundary.

B/E—36 to 80 inches; reddish brown (2.5YR 4/4) loamy sand (Bt); common distinct clay bridging between sand grains; occupies about 70 percent of the horizon; surrounded by light reddish brown (5YR 6/3) sand, pinkish gray (5YR 7/2) dry (E); weak coarse subangular blocky structure; firm; few very fine to medium roots; about 5 percent gravel and 2 percent cobbles; moderately acid.

The content of gravel ranges from 0 to 15 percent in the solum and from 0 to 10 percent in the substratum. The content of cobbles ranges from 0 to 15 percent in the solum and from 0 to 5 percent in the substratum. The content of stones ranges from 0 to 2 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly loamy sand, but the range includes loamy fine sand and sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is loamy fine sand, loamy sand, or sandy loam or the gravelly or cobbly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loamy sand or loamy fine sand or the gravelly or cobbly analogs of these textures. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR, value or 4 or 5, and chroma of 4 to 6. It is loamy sand, loamy fine sand, gravelly loamy sand, or gravelly loamy fine sand.

The Bt part of the E/B and B/E horizons has hue of 2.5YR to 7.5YR, value of 3 or 4, and chroma of 3 to 6. It is loamy sand, sandy loam, or fine sandy loam or the gravelly or cobbly analogs of these textures. The E part of the B/E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It is sand, loamy sand, or loamy fine sand or the gravelly or cobbly analogs of these textures. In some pedons the B/E horizon has characteristics of a weak fragipan.

Some pedons have a C horizon. This horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 6. It is loamy sand or sand.

Kinross Series

The Kinross series consists of very deep, poorly drained, rapidly permeable soils in depressions on outwash plains, moraines, and till-floored lake plains. These soils formed in sandy outwash and glaciolacustrine deposits. Slopes are 0 to 1 percent.

Typical pedon of Kinross mucky peat, 60 feet west and 2,193 feet south of the northeast corner of sec. 36, T. 45 N., R. 25 W.; near Bass Lake; USGS Little Lake topographic quadrangle; lat. 46 degrees 15 minutes 12 seconds N. and long. 87 degrees 22 minutes 02 seconds W.

Oe—0 to 3 inches; black (7.5YR 2.5/1) mucky peat; weak medium granular structure; very friable; many very fine to medium roots; extremely acid; abrupt smooth boundary.

Oa—3 to 5 inches; very dark gray (7.5YR 3/1) muck; weak medium granular structure; very friable; many very fine to medium roots; extremely acid; abrupt smooth boundary.

E—5 to 10 inches; light brownish gray (10YR 6/2) sand, light gray (10YR 7/2) dry; weak medium subangular blocky structure; very friable; many very fine to medium roots; many medium and coarse distinct dark brown (10YR 3/3) and dark yellowish

brown (10YR 4/4) masses of iron accumulation; extremely acid; abrupt wavy boundary.

Bhs—10 to 15 inches; very dark brown (7.5YR 2.5/2) sand; weak fine and medium subangular blocky structure; friable; many very fine to medium roots; common medium prominent strong brown (7.5YR 4/6) and dark brown (7.5YR 3/4) masses of iron accumulation; discontinuous dark reddish brown (5YR 3/2, strongly cemented ortstein occupies about 30 percent of the horizon; about 3 percent gravel; extremely acid; clear wavy boundary.

Bs—15 to 30 inches; dark brown (7.5YR 3/4) sand; weak fine subangular blocky structure; very friable; common very fine and fine roots; common medium distinct brown (7.5YR 4/3) masses of iron accumulation; about 3 percent gravel; very strongly acid; gradual wavy boundary.

BC—30 to 42 inches; dark yellowish brown (10YR 4/4) sand; single grain; loose; common medium and coarse distinct strong brown (7.5YR 4/6) masses of iron accumulation; very strongly acid; gradual wavy boundary.

C—42 to 80 inches; brown (10YR 5/3) sand; single grain; loose; very strongly acid.

The content of gravel ranges from 0 to 5 percent throughout the profile.

The Oe horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The Oa horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The E horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 1 to 3. It is sand.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. It is sand.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 to 6. It is sand. Some pedons have a BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is sand.

Liminga Series

The Liminga series consists of very deep, well drained, rapidly permeable soils on till-floored lake plains and outwash plains. These soils formed in sandy glaciofluvial deposits. Slopes range from 1 to 18 percent.

Typical pedon of Liminga fine sand, 6 to 18 percent slopes; 115 feet east and 510 feet south of the northwest corner of sec. 26, T. 51 N., R. 27 W.; USGS Big Bay topographic quadrangle; lat. 46 degrees 47 minutes 19 seconds N. and long. 87 degrees 42 minutes 20 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; many very fine to coarse roots; about 1 percent gravel; extremely acid; abrupt smooth boundary.

A—1 to 2 inches; black (10YR 2/1) fine sand, dark brown (7.5YR 3/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 1 percent gravel; extremely acid; clear smooth boundary.

E—2 to 4 inches; reddish gray (5YR 5/2) fine sand, pinkish gray (5YR 6/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 1 percent gravel; extremely acid; abrupt wavy boundary.

Bhs—4 to 6 inches; dark reddish brown (5YR 3/2) fine sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 1 percent gravel; very strongly acid; clear wavy boundary.

Bs1—6 to 9 inches; dark reddish brown (5YR 3/4) fine sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 1 percent gravel; very strongly acid; clear wavy boundary.

Bs2—9 to 19 inches; reddish brown (5YR 4/4) fine sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; columns of very dusky red (2.5YR 2.5/2) and yellowish red (5YR 4/6), strongly to weakly cemented ortstein 5 to 12 inches wide extend to a depth of 43 inches; the ortstein columns are 2 to 26 inches apart and occupy 37 percent (15 of 40 inches) of the horizon; about 1 percent gravel; very strongly acid; gradual irregular boundary.

BC—19 to 30 inches; strong brown (7.5YR 4/6) fine sand; weak fine subangular blocky structure; very friable; few very fine and fine roots; about 1 percent gravel; very strongly acid; gradual wavy boundary.

C—30 to 80 inches; brown (7.5YR 5/4) fine sand; single grain; loose; few distinct dark reddish brown (2.5YR 3/4) color bands; about 1 percent gravel; strongly acid.

The content of ortstein in the spodic horizon ranges from 10 to 40 percent. The content of gravel ranges from 0 to 5 percent throughout the profile. The profile is fine sand throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6.

The BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6.

Mancelona Series

The Mancelona series consists of very deep, somewhat excessively drained soils on outwash terraces. These soils formed in sandy and gravelly glaciofluvial deposits. Permeability is moderately rapid in the upper part of the profile and very rapid in the sandy and gravelly lower part. Slopes range from 1 to 18 percent.

Typical pedon of Mancelona sandy loam, in an area of Nadeau-Mancelona complex, 1 to 6 percent slopes; southwest of Anderson Lake; 2,200 feet east and 2,150 feet south of the northwest corner of sec. 14, T. 44 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 12 minutes 45 seconds N. and long. 87 degrees 31 minutes 27 seconds W.

A—0 to 3 inches; black (7.5YR 2.5/1) sandy loam, gray (7.5YR 5/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 1 percent gravel; strongly acid; abrupt smooth boundary.

E—3 to 10 inches; reddish gray (5YR 5/2) loamy sand, light gray (7.5YR 7/1) dry; moderate medium subangular blocky structure; friable; common very fine to medium roots; about 1 percent gravel; moderately acid; abrupt wavy boundary.

Bs1—10 to 12 inches; dark reddish brown (5YR 3/4) loamy fine sand; moderate fine subangular blocky structure; friable; common very fine to medium roots; about 5 percent gravel and 1 percent cobbles; moderately acid; clear wavy boundary.

Bs2—12 to 18 inches; brown (7.5YR 4/4) loamy fine sand; moderate medium subangular blocky structure; friable; common very fine to medium roots; about 5 percent gravel and 1 percent cobbles; moderately acid; clear irregular boundary.

Bw—18 to 33 inches; yellowish brown (10YR 5/4) sand; moderate medium subangular blocky structure; friable; few very fine and fine roots; about 3 percent gravel and 1 percent cobbles; slightly acid; clear wavy boundary.

2Bt—33 to 37 inches; brown (7.5YR 4/2) gravelly sandy loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; few distinct brown (7.5YR 4/3) clay films on faces of peds; few distinct brown (7.5YR 4/3) clay bridges between sand grains; about 15 percent gravel and 1 percent cobbles; neutral; clear wavy boundary.

3C—37 to 80 inches; light yellowish brown (10YR 6/4) and dark yellowish brown (10YR 3/4), stratified very gravelly sand and sand; single grain; loose; about 25 percent gravel and 10 percent cobbles; slightly effervescent; slightly alkaline.

The content of gravel ranges from 1 to 20 percent in the solum and from 15 to 50 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly sandy loam, but the range includes loamy sand, sand, gravelly loamy sand, and gravelly sand.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 to 3. It is sand, loamy sand, gravelly sand, or gravelly loamy sand.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is sand, loamy sand, or loamy fine sand or the gravelly analogs of these textures.

The Bs2 horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand, loamy fine sand, or loamy sand or the gravelly analogs of these textures.

The 2Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loamy sand, sandy loam, gravelly loamy sand, or gravelly sandy loam.

The 3C horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is stratified sand, gravelly sand, very gravelly sand, and coarse sand.

Mashek Series

The Mashek series consists of very deep, moderately well drained soils on drumlins and ground moraines. These soils are moderately deep or deep to dense till. They formed in loamy till. Permeability is moderate in the upper part, moderately slow in the argillic horizon, and very slow in the dense till. Slopes range from 0 to 4 percent.

Typical pedon of Mashek fine sandy loam, 0 to 4 percent slopes; 1,600 feet north and 1,600 feet west of the southeast corner of sec. 34, T. 44 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 09 minutes 50 seconds N. and long. 87 degrees 32 minutes 21.5 seconds W.

A—0 to 3 inches; dark brown (7.5YR 3/2) fine sandy loam, brown (7.5YR 5/2) dry; moderate fine granular structure; friable; many fine to coarse roots; about 3 percent gravel and 2 percent cobbles; very strongly acid; clear wavy boundary.

Bs—3 to 17 inches; dark brown (7.5YR 3/4) fine sandy loam; weak fine subangular blocky structure; friable; many fine to coarse roots; about 3 percent gravel and 2 percent cobbles; strongly acid; clear wavy boundary.

E/B—17 to 27 inches; about 60 percent brown (7.5YR 5/4) loamy fine sand, light brown (7.5YR 6/4) dry (E); occurs as tongues extending into or completely surrounding isolated remnants of reddish brown (5YR 4/4) fine sandy loam (Bt); weak fine subangular blocky structure; friable; few distinct strong brown (7.5YR 5/6) clay films on faces of peds and in root channels; many fine to coarse roots; about 3 percent gravel and 2 percent cobbles; neutral; gradual wavy boundary.

2Bt—27 to 38 inches; reddish brown (5YR 4/4) cobbly fine sandy loam; weak thick platy structure parting to weak medium subangular blocky; friable; common fine and medium roots; common distinct strong brown (7.5YR 5/6) clay films on faces of peds and in root channels; about 13 percent cobbles and 13 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

2BC—38 to 43 inches; brown (7.5YR 4/4) cobbly fine sandy loam; weak thick platy structure parting to weak fine subangular blocky; friable; common fine and medium roots; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 13 percent cobbles and 21 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

2Cd—43 to 80 inches; brown (7.5YR 5/4) cobbly fine sandy loam; massive with weakly expressed thick plates inherent from deposition; very firm; few fine distinct rounded dark reddish brown (5YR 3/3) iron concretions; about 17 percent gravel and 16 percent cobbles; strongly effervescent; moderately alkaline.

The depth to dense till ranges from 30 to 50 inches. The content of gravel ranges from 2 to 10 percent in the upper part of the solum and from 5 to 20 percent in the lower part of the solum and in the substratum. The content of cobbles ranges from 0 to 5 percent in the upper part of the solum and from 0 to 20 percent in the lower part of the solum and in the substratum. The content of stones ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam. Some pedons have an E horizon.

The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam or sandy loam.

The E part of the E/B horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 2 to 4. It is loamy fine sand, loamy sand, or sandy loam. The Bt part of the E/B horizon has hue of 5YR and value and chroma of 4. It is fine sandy loam.

The 2Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 4. It is loam or fine sandy loam or the cobbly or gravelly analogs of these textures.

The 2BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4. It is cobbly fine sandy loam or gravelly fine sandy loam.

The 2Cd horizon has hue of 7.5YR, value of 5, and chroma of 4. It is cobbly fine sandy loam or gravelly fine sandy loam.

Michigamme Series

The Michigamme series consists of well drained, moderately permeable soils that are moderately deep to bedrock. These soils are on bedrock-controlled moraines. They formed in a silty or loamy mantle over loamy till overlying igneous or metamorphic bedrock. Slopes range from 6 to 70 percent.

Typical pedon of Michigamme cobbly fine sandy loam, in an area of Dishno-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery; 500 feet west and 1,200 feet south of the northeast corner of sec. 9, T. 51 N., R. 29 W.; in the Cliff River area; USGS Mountain Lake topographic quadrangle; lat. 46 degrees 50 minutes 03 seconds N. and long. 87 degrees 58 minutes 57 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—2 to 5 inches; dark reddish gray (5YR 4/2) cobbly fine sandy loam, gray (5YR 6/1) dry; moderate very fine subangular blocky structure; friable; many very fine to coarse roots; about 20 percent cobbles, 8 percent gravel, and 2 percent stones; strongly acid; abrupt wavy boundary.

Bhs—5 to 8 inches; dark reddish brown (5YR 3/3) cobbly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 20 percent cobbles, 8 percent gravel, and 2 percent stones; strongly acid; clear irregular boundary.

Bs—8 to 24 inches; dark reddish brown (5YR 3/4) cobbly fine sandy loam; weak very fine subangular blocky structure; friable; many very fine to coarse roots; about 20 percent cobbles, 8 percent gravel, and 2 percent stones; strongly acid; gradual broken boundary.

E/B—24 to 29 inches; about 60 percent reddish brown (5YR 5/3) cobbly fine sandy loam, pinkish gray (5YR 6/2) dry (E); surrounding peds of reddish brown (5YR 4/4) cobbly fine sandy loam (Bt); weak thick platy structure parting to weak fine subangular blocky; firm; common very fine to medium roots; about 20 percent

cobbles, 8 percent gravel, and 2 percent stones; moderately acid; abrupt irregular boundary.
2R—29 inches; gneiss bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 20 percent throughout the profile, the content of cobbles ranges from 0 to 20 percent throughout the profile, and the content of stones ranges from 0 to 5 percent throughout the profile. The content of rock fragments averages less than 35 percent in the control section.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is silt loam, very fine sandy loam, or fine sandy loam or the gravelly or cobbly analogs of these textures.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is dominantly cobbly fine sandy loam, but the range includes silt loam, fine sandy loam, gravelly silt loam, and gravelly fine sandy loam.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is fine sandy loam or silt loam or the gravelly or cobbly analogs of these textures.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is fine sandy loam or silt loam or the gravelly or cobbly analogs of these textures. Some pedons have a BC horizon.

The E part of the E/B horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is cobbly fine sandy loam or gravelly fine sandy loam. The Bt part of the E/B horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 3 or 4. It is cobbly fine sandy loam or gravelly fine sandy loam. Some pedons have a C horizon.

The underlying bedrock is igneous or metamorphic.

Minocqua Series

The Minocqua series consists of very deep, poorly drained soils in depressions on outwash plains and outwash terraces. These soils formed in loamy deposits overlying stratified sandy and gravelly outwash. Permeability is moderate in the loamy upper part of the profile and very rapid in the sandy lower part. Slopes are 0 to 1 percent.

Typical pedon of Minocqua muck, 350 feet east and 1,400 feet south of the northwest corner of sec. 9, T. 45 N., R. 26 W.; USGS Cataract Basin topographic quadrangle; lat. 46 degrees 18 minutes 54 seconds N. and long. 87 degrees 34 minutes 25 seconds W.

Oi—0 to 2 inches; dark brown (7.5YR 3/2), undecomposed sphagnum moss; extremely acid; abrupt smooth boundary.
Oa—2 to 5 inches; black (7.5YR 2.5/1) muck; moderate medium granular structure; very friable; many very fine to coarse roots; very strongly acid; clear broken boundary.
A—5 to 7 inches; very dark gray (10YR 3/1) mucky fine sandy loam, gray (10YR 5/1) dry; moderate medium subangular blocky structure; friable; few very fine to coarse roots; about 2 percent gravel; very strongly acid; clear smooth boundary.
Eg1—7 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate subangular blocky structure; friable; few very fine and fine roots; common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 2 percent gravel; strongly acid; gradual broken boundary.
Eg2—11 to 18 inches; grayish brown (2.5Y 5/2) very fine sandy loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; friable; few very fine and fine roots; many medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 2 percent gravel; strongly acid; clear broken boundary.
Bg—18 to 23 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine subangular blocky structure; very friable; thin lenses of loamy sand; few fine

prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 5 percent gravel; moderately acid; abrupt smooth boundary.

2Cg—23 to 80 inches; dark grayish brown (10YR 4/2) gravelly coarse sand; single grain; loose; about 25 percent gravel; moderately acid.

Depth to the sandy substratum ranges from 20 to 40 inches. The content of gravel ranges from 0 to 10 percent in the A, Eg, and Bg horizons and from 5 to 50 percent in the substratum.

The Oi horizon has hue of 7.5YR or 10YR, value of 3, and chroma of 1 or 2.

The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam, sandy loam, or silt loam or the mucky analogs of these textures.

The Eg horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2. It is fine sandy loam, very fine sandy loam, or sandy loam.

The Bg horizon has hue of 5Y to 10YR, value of 4 or 5, and chroma of 1 or 2. It is fine sandy loam, very fine sandy loam, or sandy loam. Some pedons have a Bw horizon.

The 2Cg horizon has hue of 10YR, value of 4, and chroma of 2. It is gravelly coarse sand, sand, or very gravelly sand.

Munising Series

The Munising series consists of very deep, moderately well drained soils on ground moraines, dissected sandstone benches, and till-floored lake plains. These soils are shallow or moderately deep to a fragipan. They formed in loamy till. Permeability is moderate in the upper part, very slow in the fragipan, and moderate in the lower part. Slopes range from 1 to 18 percent.

Typical pedon of Munising fine sandy loam (fig. 20), 1 to 6 percent slopes; 165 feet east and 990 feet south of the northwest corner of sec. 7, T. 51 N., R. 29 W.; USGS McComb Corner topographic quadrangle; lat. 46 degrees 49 minutes 53 seconds N. and long. 88 degrees 02 minutes 40 seconds W.

Oe—0 to 2 inches; black (N 2.5/0), partially decomposed forest litter; many fine to coarse roots; abrupt smooth boundary.

E—2 to 6 inches; reddish gray (5YR 5/2) fine sandy loam, pinkish gray (5YR 6/2) dry; weak fine subangular blocky structure; very friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; very strongly acid; clear broken boundary.

Bhs—6 to 10 inches; dark reddish brown (5YR 3/3) fine sandy loam; weak fine subangular blocky structure; friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; strongly acid; gradual broken boundary.

Bs1—10 to 15 inches; dark reddish brown (5YR 3/4) fine sandy loam; weak fine subangular blocky structure; friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; strongly acid; gradual wavy boundary.

Bs2—15 to 18 inches; yellowish red (5YR 4/6) fine sandy loam; weak thin platy structure; friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; moderately acid; gradual wavy boundary.

(E/B)x—18 to 29 inches; about 60 percent reddish brown (5YR 5/3) loamy fine sand, pinkish gray (5YR 6/2) dry (E); surrounding isolated remnants of reddish brown (5YR 4/4) fine sandy loam (Bt); few distinct reddish brown (5YR 4/4) clay films in root channels; moderate thick platy structure; very firm; few fine roots in cracks 10 to 20 inches apart; many fine vesicular pores; few medium distinct yellowish red

Figure 20.—Typical profile of Munising fine sandy loam. The fragipan is at a depth of 18 inches.

(5YR 5/8) masses of iron accumulation; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; moderately acid; gradual wavy boundary.

(B/E)x—29 to 50 inches; reddish brown (5YR 4/4) fine sandy loam (Bt); common distinct reddish brown (5YR 4/4) clay films in root channels; occupies about 60 percent of the horizon; surrounded by reddish brown (5YR 5/3) loamy fine sand, pinkish gray (5YR 6/2) dry (E); moderate thick platy structure; firm; many fine

vesicular pores; common medium distinct yellowish red (5YR 5/8) masses of iron accumulation; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; moderately acid; gradual wavy boundary.

BC—50 to 59 inches; reddish brown (5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; about 5 percent gravel, 5 percent cobbles, and 2 percent stones; moderately acid; gradual wavy boundary.

C—59 to 80 inches; reddish brown (5YR 4/4) sandy loam; massive with weakly expressed thick platiness inherent from deposition; friable; about 7 percent gravel, 5 percent cobbles, and 2 percent stones; moderately acid.

Depth to the fragipan ranges from 15 to 24 inches. The content of gravel ranges from 1 to 10 percent throughout the profile, the content of cobbles ranges from 0 to 5 percent throughout the profile, and the content of stones ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes sandy loam and loamy sand. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is fine sandy loam or sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam or sandy loam.

The Bs2 horizon has hue of 5YR, value of 4, and chroma of 4 to 6. It is fine sandy loam or sandy loam.

The E part of the (E/B)x and (B/E)x horizons has hue of 5YR, value of 5 or 6, and chroma of 2 or 3. It is loamy fine sand, sandy loam, or loamy sand. The Bt part of the (E/B)x and (B/E)x horizons has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. It is fine sandy loam or sandy loam. Some pedons have a Btx horizon.

The BC horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

Nadeau Series

The Nadeau series consists of very deep, well drained soils on outwash terraces, outwash plains, eskers, drumlins, and ground moraines. These soils formed in a loamy mantle over gravelly and sandy outwash. Permeability is moderate in the loamy upper part of the profile and very rapid in the sandy lower part. Slopes range from 1 to 18 percent.

Typical pedon of Nadeau fine sandy loam, 1 to 6 percent slopes; south of the Escanaba River, 3$^1/_2$ miles east of Watson; 600 feet south and 750 feet east of the northwest corner of sec. 20, T. 42 N., R. 24 W.; USGS Swimming Hole Creek topographic quadrangle; lat. 46 degrees 01 minute 36 seconds N. and long. 87 degrees 20 minutes 37 seconds W.

Oe—0 to 1 inch; black (N 2.5/0), partially decomposed forest litter; neutral; abrupt smooth boundary.

A—1 to 5 inches; black (N 2.5/0) fine sandy loam, dark brown (7.5YR 3/2) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 5 percent gravel and 2 percent cobbles; neutral; clear wavy boundary.

E—5 to 7 inches; brown (7.5YR 4/2) fine sandy loam, pinkish gray (7.5YR 6/2) dry; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 6 percent gravel and 2 percent cobbles; neutral; clear wavy boundary.

Bw—7 to 10 inches; brown (7.5YR 5/4) gravelly fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 12 percent gravel and 8 percent cobbles; neutral; clear wavy boundary.
Bt1—10 to 17 inches; reddish brown (5YR 4/4) gravelly fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; common distinct reddish brown (5YR 4/3) clay films on faces of peds; about 15 percent gravel and 8 percent cobbles; slightly alkaline; clear wavy boundary.
2Bt2—17 to 23 inches; reddish brown (5YR 4/4) very gravelly sandy loam; weak fine subangular blocky structure; very friable; common fine to medium roots; common reddish brown (5YR 4/3) clay films on faces of peds; about 35 percent gravel and 15 percent cobbles; slightly effervescent; slightly alkaline; clear smooth boundary.
2BC—23 to 36 inches; brown (7.5YR 4/4) very gravelly sand; single grain; loose; common fine and medium roots; about 40 percent gravel and 20 percent cobbles; strongly effervescent; moderately alkaline; clear smooth boundary.
2C—36 to 80 inches; brown (7.5YR 5/4) very gravelly sand; single grain; loose; few fine roots; about 40 percent gravel and 20 percent cobbles; strongly effervescent; moderately alkaline.

The content of gravel ranges from 1 to 20 percent in the A, E, Bw, and Bt1 horizons and from 35 to 50 percent in the 2Bt2, 2BC, and 2C horizons. The content of cobbles ranges from 0 to 10 percent in the loamy upper part of the solum and from 5 to 20 percent in the lower part of the solum and in the substratum.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is dominantly fine sandy loam, but the range includes gravelly fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The Bw horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The Bt1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 3 to 6. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The 2Bt2 horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is very gravelly fine sandy loam, very gravelly sandy loam, or very gravelly loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4. It is very gravelly sand or very gravelly coarse sand.

Nahma Series

The Nahma series consists of poorly drained, moderately permeable soils that are moderately deep to bedrock. These soils are in depressions and drainageways on ground moraines. They formed in loamy till overlying limestone, dolomite, or dolomitic sandstone bedrock. Slopes are 0 to 1 percent.

Typical pedon of Nahma muck, in an area of Nahma-Sundell complex, 0 to 4 percent slopes; 600 feet north and 2,075 feet west of the southeast corner of sec. 35, T. 40 N., R. 25 W.; USGS La Branche topographic quadrangle; lat. 45 degrees 59 minutes 15 seconds N. and long. 87 degrees 23 minutes 46 seconds W.

Oa1—0 to 7 inches; black (N 2.5/0) muck; weak very fine granular structure; very friable; many very fine to coarse roots; about 1 percent gravel and 1 percent cobbles; neutral; clear smooth boundary.
Oa2—7 to 11 inches; black (N 2.5/0) muck; moderate medium granular structure; very friable; many very fine to coarse roots; about 1 percent gravel and 1 percent cobbles; neutral; abrupt smooth boundary.
A—11 to 14 inches; very dark grayish brown (10YR 2/1) mucky loam, dark gray (10YR 4/1) dry; moderate medium granular structure; very friable; few very fine to

medium roots; about 1 percent gravel and 2 percent cobbles; slightly alkaline; abrupt wavy boundary.

Bg—14 to 17 inches; dark gray (10YR 4/1) loam; moderate medium platy structure; friable; few very fine to medium roots; common medium distinct brown (10YR 4/3) masses of iron accumulation; about 5 percent gravel and 2 percent cobbles; slightly alkaline; clear wavy boundary.

Bw—17 to 19 inches; brown (10YR 4/3) loam; moderate medium platy structure; friable; few very fine to medium roots; few medium distinct dark grayish brown (10YR 4/2) iron depletions; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; about 5 percent gravel and 2 percent cobbles; slightly alkaline; clear wavy boundary.

2C—19 to 24 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive with weakly expressed medium platiness inherent from deposition; friable; few very fine to medium roots; common fine distinct dark grayish brown (10YR 4/2) iron depletions; many fine distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 14 percent gravel and 3 percent cobbles; slightly effervescent; moderately alkaline; abrupt smooth boundary.

3R—24 inches; dolomitic sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 10 percent in the solum and from 10 to 15 percent in the substratum. The content of cobbles and flagstones ranges from 0 to 5 percent in the solum and from 2 to 10 percent in the substratum.

The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 2.5 and chroma of 0 or 1.

The A horizon has hue of 10YR, value of 2, and chroma of 1 or 2. It is mucky loam or loam.

The Bg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It is loam, fine sandy loam, or sandy loam.

The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam, fine sandy loam, or sandy loam.

The 2C horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is gravelly fine sandy loam or gravelly sandy loam. Some pedons have a Cr horizon.

The underlying bedrock is limestone, dolomite, or dolomitic sandstone.

Net Series

The Net series consists of very deep, somewhat poorly drained soils on bedrock-controlled moraines and disintegration moraines. These soils are shallow or moderately deep to a fragipan. They formed in a silty or loamy mantle over loamy or sandy till. Permeability is moderate in the upper part of the profile, very slow in the fragipan, and moderate in the substratum. Slopes range from 0 to 3 percent.

Typical pedon of Net cobbly very fine sandy loam, in an area of Witbeck-Net complex, 0 to 3 percent slopes, extremely bouldery; near Grant Lake; 1,700 feet east and 700 feet south of the northwest corner of sec. 35, T. 46 N., R. 30 W.; USGS Witch Lake topographic quadrangle; lat. 46 degrees 20 minutes 45 seconds N. and long. 88 degrees 02 minutes 07 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—2 to 5 inches; pinkish gray (5YR 6/2) cobbly very fine sandy loam, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; friable; many very fine to

coarse roots; about 20 percent cobbles, 8 percent stones, and 5 percent gravel; strongly acid; abrupt wavy boundary.

Bs1—5 to 8 inches; dark brown (7.5YR 3/4) cobbly very fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; common medium distinct reddish brown (5YR 5/4) masses of iron accumulation; about 20 percent cobbles, 8 percent stones, and 5 percent gravel; strongly acid; clear wavy boundary.

Bs2—8 to 18 inches; reddish brown (5YR 4/4) cobbly very fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; common medium distinct yellowish red (5YR 5/8) and dark reddish brown (2.5YR 3/4) masses of iron accumulation; about 20 percent cobbles, 8 percent stones, and 5 percent gravel; strongly acid; gradual wavy boundary.

2Bx—18 to 45 inches; brown (7.5YR 4/4) gravelly fine sandy loam; moderate thin platy structure; very firm; very few fine roots in cracks 10 to 20 inches apart; common fine vesicular pores; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; about 13 percent gravel, 5 percent stones, and 4 percent cobbles; moderately acid; gradual wavy boundary.

2C—45 to 80 inches; brown (7.5YR 4/4) gravelly fine sandy loam; massive with moderately expressed thick platiness inherent from deposition; friable; about 13 percent gravel, 5 percent stones, and 4 percent cobbles; moderately acid.

Depth to the fragipan ranges from 15 to 25 inches. The content of gravel ranges from 5 to 10 percent above the fragipan and from 10 to 25 percent in the rest of the profile. The content of cobbles ranges from 0 to 20 percent above the fragipan and from 0 to 10 percent in the rest of the profile. The content of stones ranges from 0 to 10 percent throughout the profile.

The A horizon, if it occurs, has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is very fine sandy loam, silt loam, or fine sandy loam or the gravelly or cobbly analogs of these textures.

The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 or 3. It is very fine sandy loam, silt loam, or fine sandy loam or the gravelly or cobbly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is very fine sandy loam, silt loam, or fine sandy loam or the gravelly or cobbly analogs of these textures. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is very fine sandy loam, silt loam, or fine sandy loam or the gravelly or cobbly analogs of these textures.

The 2Bx horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is gravelly fine sandy loam or gravelly sandy loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is gravelly fine sandy loam, gravelly sandy loam, or gravelly loamy sand.

Northland Series

The Northland series consists of very deep, moderately well drained soils on outwash terraces on drumlinized ground moraines. These soils formed in a loamy mantle overlying sandy and gravelly outwash. Permeability is moderate in the loamy upper part of the profile and very rapid in the sandy and gravelly lower part. Slopes range from 0 to 4 percent.

Typical pedon of Northland loamy fine sand, 0 to 4 percent slopes, 900 feet east and 250 feet north of the southwest corner of sec. 22, T. 42 N., R. 26 W.; USGS Northland topographic quadrangle; lat. 46 degrees 00 minutes 56.5 seconds N. and long. 87 degrees 33 minutes 06.3 seconds W.

Oa—0 to 3 inches; black (N 2.5/0), well decomposed organic matter; moderate very fine granular structure; very friable; many very fine to coarse roots; strongly acid; abrupt wavy boundary.

E—3 to 5 inches; pinkish gray (7.5YR 6/2) loamy fine sand, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; friable; common very fine to coarse roots; about 4 percent gravel; strongly acid; clear irregular boundary.

Bw—5 to 8 inches; strong brown (7.5YR 4/6) fine sandy loam; weak fine subangular blocky structure; friable; common very fine to coarse roots; about 4 percent gravel; moderately acid; clear broken boundary.

Bt1—8 to 18 inches; brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common distinct dark brown (7.5YR 3/4) clay films on faces of peds and in root channels; about 6 percent gravel; slightly alkaline; clear irregular boundary.

2Bt2—18 to 22 inches; reddish brown (5YR 4/4) very gravelly loamy coarse sand; single grain; loose; common very fine to medium roots; common faint clay bridging between sand grains; about 50 percent gravel; slightly effervescent; slightly alkaline; clear irregular boundary.

2BC—22 to 38 inches; brown (7.5YR 5/4) very gravelly sand; single grain; loose; few very fine to fine roots; few medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 50 percent gravel; slightly effervescent; moderately alkaline; clear irregular boundary.

2C—38 to 80 inches; brown (10YR 5/3) very gravelly sand; single grain; loose; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; about 50 percent gravel and 10 percent cobbles; strongly effervescent; moderately alkaline.

The thickness of the loamy mantle and the depth to the gravelly outwash range from 15 to 30 inches. The content of gravel ranges from 1 to 15 percent in the A, E, and Bw horizons, from 1 to 20 percent in the Bt horizon, and from 35 to 60 percent in the BC and C horizons. The content of cobbles ranges from 0 to 5 percent in the loamy mantle and from 0 to 25 percent in the underlying sandy outwash.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam. Some pedons have an Oa horizon.

The E horizon has hue of 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is fine sandy loam or loamy fine sand.

The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sandy loam.

The Bt1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loam, fine sandy loam, or sandy loam or the gravelly analogs of these textures.

The 2Bt2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is very gravelly loamy coarse sand or very gravelly sand.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is very gravelly sand or very gravelly coarse sand. In some pedons it has thin strata of sand or gravelly sand.

Ocqueoc Series

The Ocqueoc series consists of very deep, well drained soils on till-floored lake plains. These soils formed in sandy glaciofluvial deposits overlying stratified loamy glaciolacustrine deposits. Permeability is rapid in the sandy upper part of the profile and moderately slow in the loamy lower part. Slopes range from 0 to 35 percent.

Typical pedon of Ocqueoc fine sand, in an area of Rousseau-Ocqueoc fine sands, 6 to 18 percent slopes; 3,600 feet south and 1,350 feet west of the northeast corner of

sec. 1, T. 47 N., R. 25 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 29 minutes 43 seconds N. and long. 87 degrees 22 minutes 06 seconds W.

Oe—0 to 1 inch; black (N 2.5/0), partially decomposed organic matter; common very fine to coarse roots; strongly acid; abrupt smooth boundary.

A—1 to 2 inches; very dark gray (10YR 3/1) fine sand, gray (10YR 5/1) dry; weak very fine granular structure; very friable; many very fine to coarse roots; strongly acid; abrupt wavy boundary.

E—2 to 7 inches; pinkish gray (7.5YR 6/2) fine sand, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; strongly acid; abrupt broken boundary.

Bs1—7 to 12 inches; reddish brown (5YR 4/4) fine sand; weak fine subangular blocky structure; friable; many very fine to coarse roots; dark reddish brown (5YR 3/2) and reddish brown (5YR 4/4), moderately cemented ortstein occupies 27 percent (11 of 40 inches) of the horizon and occurs as tongues 4 to 7 inches wide and 5 to 16 inches apart; the tongues extend into the Bs2 horizon to a depth of 22 inches; moderately acid; clear wavy boundary.

Bs2—12 to 22 inches; yellowish red (5YR 4/6) fine sand; weak fine subangular blocky structure; friable; common very fine to coarse roots; tongues of ortstein extending from the Bs1 horizon occupy 20 percent (8 of 40 inches) of this horizon; moderately acid; clear wavy boundary.

BC—22 to 27 inches; reddish brown (5YR 5/4) fine sand; weak fine subangular blocky structure; friable; few very fine and fine roots; moderately acid; abrupt wavy boundary.

C1—27 to 33 inches; brown (7.5YR 5/3) loamy fine sand; massive; friable; few very fine and fine roots; moderately acid; clear wavy boundary.

2C2—33 to 80 inches; stratified reddish brown (5YR 5/4) very fine sandy loam and light reddish brown (5YR 6/3) loamy very fine sand; massive with weakly expressed thick platiness inherent from deposition; firm; few very fine and fine roots; common fine vesicular pores; moderately acid.

Thickness of the sandy mantle and depth to the loamy substratum range from 20 to 40 inches. The content of gravel ranges from 0 to 5 percent in the solum.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly fine sand, but the range includes sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. It is fine sand or sand.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sand or sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is fine sand or sand.

The BC horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is fine sand or sand.

The C1 horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 or 4. It is loamy fine sand or fine sand.

The 2C2 horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6. It is stratified loamy very fine sand, very fine sandy loam, fine sand, very fine sand, or silt loam.

Onaway Series

The Onaway series consists of very deep, well drained soils on drumlins and ground moraines. These soils formed in loamy till. Permeability is moderate in the upper part of the solum and moderately slow in and below the argillic horizon. Slopes range from 1 to 35 percent.

Typical pedon of Onaway fine sandy loam, 1 to 6 percent slopes; near the Menominee County line; 165 feet south and 1,485 feet west of the northeast corner of sec. 36, T. 42 N., R. 26 W.; USGS Arnold topographic quadrangle; lat. 46 degrees 00 minutes 05 seconds N. and long. 87 degrees 29 minutes 55 seconds W.

Oe—0 to 3 inches; black (N 2.5/0), partially decomposed forest litter; many very fine to coarse roots; strongly acid; abrupt smooth boundary.

E—3 to 6 inches; brown (7.5YR 5/2) fine sandy loam, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 4 percent gravel and 2 percent cobbles; slightly acid; clear broken boundary.

Bs—6 to 13 inches; brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; common very fine to medium roots; about 4 percent gravel and 2 percent cobbles; neutral; clear smooth boundary.

Bt—13 to 18 inches; dark brown (7.5YR 3/4) sandy clay loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; many distinct discontinuous dark brown (7.5YR 3/4) clay films in root channels and on faces of peds; about 8 percent gravel and 4 percent cobbles; neutral; gradual wavy boundary.

BC—18 to 25 inches; brown (7.5YR 5/4) gravelly fine sandy loam; weak thin platy structure parting to weak very fine subangular blocky; friable; few very fine and fine roots; few distinct brown (7.5YR 4/4) clay films in root channels; about 15 percent gravel, 8 percent cobbles, and 2 percent stones; slightly alkaline; gradual wavy boundary.

C—25 to 80 inches; light brown (7.5YR 6/4) gravelly fine sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; about 15 percent gravel, 8 percent cobbles, and 2 percent stones; slightly effervescent; moderately alkaline.

The depth to carbonates ranges from 15 to 30 inches. The content of gravel ranges from 2 to 10 percent in the A, E, Bs, and Bt horizons and from 10 to 20 percent in the BC and C horizons. The content of cobbles ranges from 0 to 5 percent in the A, E, Bs, and Bt horizons and from 2 to 10 percent in the BC and C horizons. The content of stones ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes sandy loam. Some pedons have an A horizon.

The Bs horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sandy loam or sandy loam.

The Bt horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is loam or sandy clay loam.

The BC horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4. It is fine sandy loam or gravelly fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4. It is gravelly fine sandy loam.

Onota Series

The Onota series consists of well drained, moderately permeable soils that are moderately deep to bedrock. These soils are on sandstone benches and dissected moraines. They formed in loamy till overlying sandstone bedrock. Slopes range from 0 to 35 percent.

Typical pedon of Onota gravelly sandy loam, 1 to 6 percent slopes; 1,100 feet east and 1,800 feet north of the southwest corner of sec. 34, T. 51 N., R. 26 W.; USGS Granite Point topographic quadrangle; lat. 46 degrees 46 minutes 18 seconds N. and long. 87 degrees 35 minutes 48 seconds W.

Oi—0 to 1 inch; undecomposed hardwood forest litter.

A—1 to 2 inches; black (5YR 2.5/1) gravelly sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many very fine to coarse roots; about 15 percent gravel and 5 percent cobbles; very strongly acid; abrupt smooth boundary.

E—2 to 7 inches; reddish gray (5YR 5/2) gravelly sandy loam, pinkish gray (5YR 6/2) dry; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 15 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bhs—7 to 10 inches; dark reddish brown (5YR 3/2) gravelly sandy loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 20 percent gravel and 10 percent cobbles; strongly acid; clear wavy boundary.

Bs—10 to 22 inches; dark reddish brown (5YR 3/4) gravelly sandy loam; weak thick platy structure; firm; few very fine and fine roots; about 20 percent gravel and 10 percent cobbles; strongly acid; abrupt wavy boundary.

2R—22 inches; dark reddish brown (2.5YR 4/4) sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 20 percent throughout the profile, and the content of cobbles and channers ranges from 0 to 10 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1. It is dominantly gravelly sandy loam, but the range includes sandy loam and loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 to 3. It is sandy loam, loamy sand, gravelly sandy loam, or gravelly loamy sand.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is sandy loam or gravelly sandy loam.

The Bs horizon has hue of 5YR, value of 3 or 4, and chroma of 4. It is sandy loam, loamy sand, gravelly sandy loam, or gravelly loamy sand.

The underlying bedrock is sandstone.

Paavola Series

The Paavola series consists of very deep, moderately well drained soils on outwash terraces on bedrock-controlled moraines. These soils are moderately deep to a fragipan. They formed in sandy and gravelly glaciofluvial deposits over loamy till. Permeability is very rapid in the sandy upper part of the profile and very slow in the lower part. Slopes range from 1 to 6 percent.

Typical pedon of Paavola very gravelly loamy sand, 1 to 6 percent slopes, stony; 1,600 feet east and 2,000 feet north of the southwest corner of sec. 23, T. 47 N., R. 23 W.; near the intersection of Camp 4 Road and Magnum Road; USGS Skandia topographic quadrangle; lat. 46 degrees 26 minutes 12 seconds N. and long. 87 degrees 09 minutes 06 seconds W.

Oe—0 to 3 inches; black (10YR 2/1), partially decomposed forest litter; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—3 to 8 inches; dark reddish gray (5YR 4/2) very gravelly loamy sand, gray (5YR 6/1) dry; weak very fine subangular blocky structure; very friable; many very fine to coarse roots; about 25 percent gravel, 12 percent cobbles, and 6 percent stones; extremely acid; clear broken boundary.

Bhs1—8 to 25 inches; dark reddish brown (5YR 3/2) extremely gravelly sand; weak very fine subangular blocky structure; friable; many very fine to coarse roots; about 40 percent gravel, 15 percent cobbles, and 6 percent stones; strongly acid; gradual wavy boundary.

Bhs2—25 to 33 inches; dark reddish brown (5YR 3/3) extremely cobbly sand; single grain; loose; common very fine to coarse roots; about 35 percent gravel, 25 percent cobbles, and 10 percent stones; strongly acid; clear wavy boundary.

2(B/E)x—33 to 80 inches; reddish brown (5YR 4/4) very cobbly fine sandy loam (Bt); few distinct reddish brown (2.5YR 4/4) clay films on faces of peds; occupies about 55 percent of the horizon; surrounded by reddish brown (5YR 5/3) very cobbly loamy fine sand, pinkish gray (5YR 6/2) dry (E); massive; very firm; few very fine and fine roots in cracks 10 to 20 inches apart; common very fine vesicular pores; common fine prominent yellowish red (5YR 5/8) masses of iron accumulation; about 17 percent cobbles, 10 percent gravel, and 10 percent stones; moderately acid.

Depth to the fragipan ranges from 20 to 38 inches. The content of gravel ranges from 15 to 35 percent in the A and E horizons, from 35 to 60 percent in the Bhs and Bs horizons, and from 5 to 40 percent in the rest of the profile. The content of cobbles and stones ranges from 5 to 20 percent in the A and E horizons and from 5 to 35 percent in the rest of the profile. The control section averages more than 35 percent rock fragments by volume.

The A horizon, if it occurs, has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is the very gravelly or very cobbly analogs of loamy sand, sand, or sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. It is dominantly very gravelly loamy sand, but the range includes very cobbly loamy sand.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. It is the extremely gravelly or extremely cobbly analogs of coarse sand, sand, or loamy sand.

The Bs horizon, if it occurs, has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. Value and chroma of 3 do not occur together. The horizon is the extremely gravelly or extremely cobbly analogs of coarse sand, sand, or loamy sand.

The E part of the 2(B/E)x horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is gravelly loamy sand, gravelly loamy fine sand, very cobbly loamy sand, or very cobbly loamy fine sand. The B part of this horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is gravelly sandy loam, gravelly fine sandy loam, very cobbly sandy loam, or very cobbly fine sandy loam.

Paquin Series

The Paquin series consists of very deep, moderately well drained soils on outwash plains, till-floored lake plains, and ground moraines. These soils are shallow to ortstein. They formed in sandy glaciofluvial and glaciolacustrine deposits. Permeability is rapid in the upper part, moderate or moderately rapid in the ortstein, and rapid in the lower part. Slopes range from 0 to 5 percent.

Typical pedon of Paquin sand, 0 to 3 percent slopes; 1,800 feet west and 2,400 feet south of the northeast corner of sec. 14, T. 46 N., R. 24 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 23 minutes 05 seconds N. and long. 87 degrees 16 minutes 09 seconds W.

Oa—0 to 4 inches; black (N 2.5/0), well decomposed leaf litter; many very fine to coarse roots; abrupt smooth boundary.

E—4 to 11 inches; reddish gray (5YR 5/2) sand, light gray (5YR 7/1) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; very strongly acid; abrupt irregular boundary.

Bhs—11 to 12 inches; dark reddish brown (5YR 2.5/2) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; extremely acid; abrupt irregular boundary.

Bhsm—12 to 14 inches; dark reddish brown (5YR 3/3) sand; strong medium subangular blocky structure; very hard; few very fine to medium roots; reddish brown (5YR 4/4), strongly cemented ortstein occupies about 93 percent (37 of 40 inches) of the horizon; the ortstein occurs as a nearly continuous layer with tongues extending into the Bs horizon; very strongly acid; gradual irregular boundary.

Bs—14 to 27 inches; brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; few very fine to medium roots; tongues of reddish brown (5YR 4/4), strongly cemented ortstein occupy 40 percent (16 of 40 inches) of the horizon and extend down from the Bhsm horizon; the tongues are 3 to 6 inches wide and 4 to 10 inches apart and extend to a depth of 22 inches; strongly acid; gradual irregular boundary.

BC—27 to 36 inches; strong brown (7.5YR 4/6) sand; moderate medium subangular blocky structure; friable; many medium distinct strong brown (7.5YR 5/8) masses of iron accumulation and common medium distinct reddish gray (5YR 5/2) iron depletions; strongly acid; clear wavy boundary.

C—36 to 80 inches; brown (7.5YR 5/4) sand; single grain; loose; moderately acid.

The depth to ortstein ranges from 10 to 16 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The profile is sand or fine sand throughout.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 2.

The Bhs and Bhsm horizons have hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4.

Pelissier Series

The Pelissier series consists of very deep, excessively drained soils on outwash plains, outwash terraces, eskers, kames, and moraines. These soils formed in gravelly and sandy outwash deposits. Permeability is moderately rapid in the loamy mantle and very rapid in the sandy and gravelly outwash. Slopes range from 1 to 35 percent.

Typical pedon of Pelissier gravelly sandy loam (fig. 21), 6 to 18 percent slopes; 1,800 feet west and 600 feet south of the northeast corner of sec. 4, T. 48 N., R. 27 W.; on the south shore of Dead Stream Storage Basin; USGS Negaunee SW topographic quadrangle; lat. 46 degrees 35 minutes 27 seconds N. and long. 87 degrees 41 minutes 09 seconds W.

Oa—0 to 2 inches; black (10YR 2/1), well decomposed leaf litter; moderate fine granular structure; very friable; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

E—2 to 6 inches; brown (7.5YR 5/2) gravelly sandy loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; friable; common very fine to coarse roots; about 20 percent gravel and 5 percent cobbles; extremely acid; clear wavy boundary.

Bs1—6 to 10 inches; dark reddish brown (5YR 3/4) gravelly sandy loam; weak medium subangular blocky structure; friable; many very fine to coarse roots; about 20 percent gravel and 5 percent cobbles; very strongly acid; gradual irregular boundary.

Bs2—10 to 21 inches; yellowish red (5YR 4/6) very gravelly loamy coarse sand; weak fine subangular blocky structure; very friable; common very fine to medium roots; about 35 percent gravel and 5 percent cobbles; strongly acid; gradual wavy boundary.

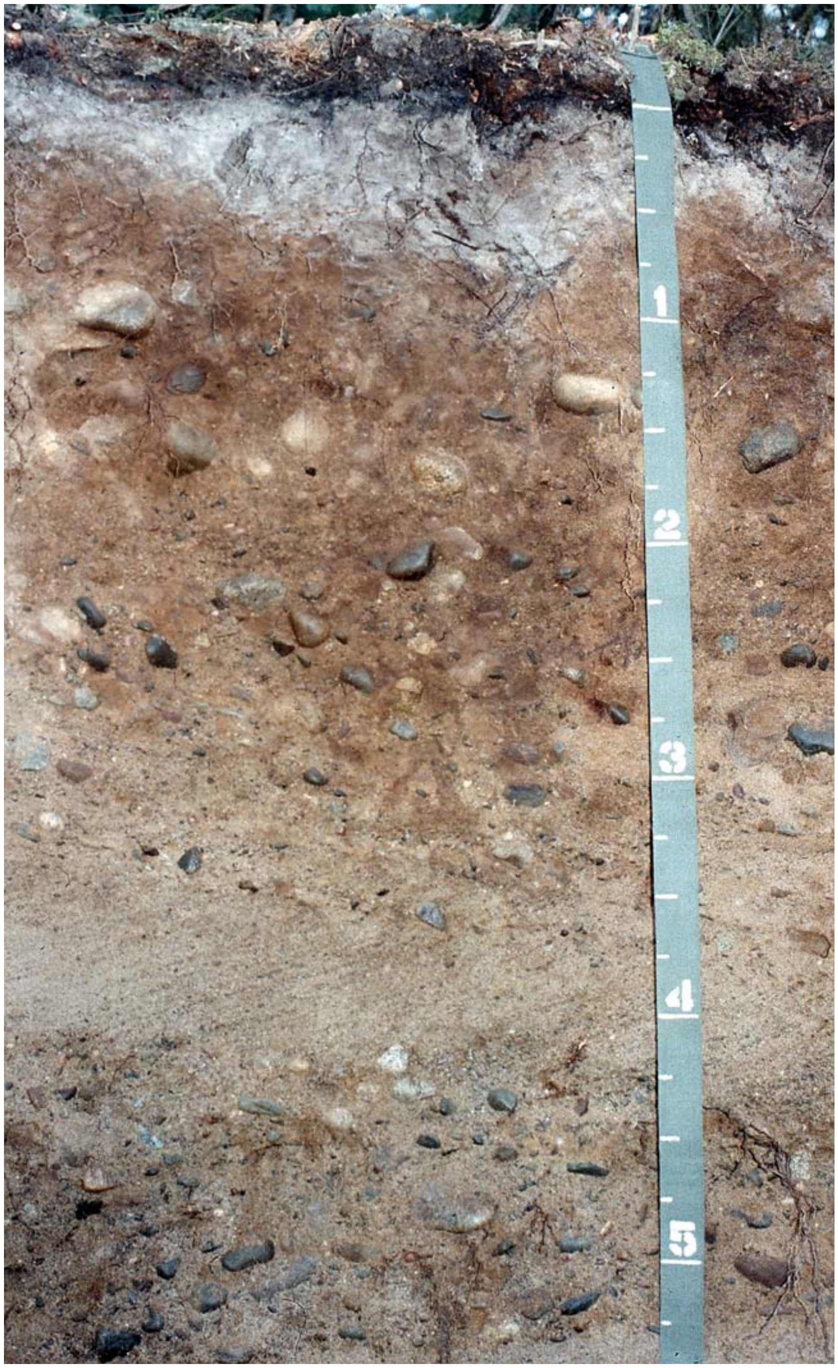


Figure 21.—Typical profile of Pelissier gravelly sandy loam. This soil is a probable source of gravel. Depth is marked in feet.

C1—21 to 36 inches; strong brown (7.5YR 5/6) very gravelly coarse sand; single grain; loose; common very fine to medium roots; about 50 percent gravel and 5 percent cobbles; strongly acid; gradual wavy boundary.

C2—36 to 80 inches; reddish yellow (7.5YR 6/6) very gravelly coarse sand; single grain; loose; few very fine and fine roots; about 50 percent gravel and 10 percent cobbles; strongly acid.

The content of gravel ranges from 15 to 35 percent in the A, E, and Bs1 horizons and from 15 to 60 percent in the rest of the profile. The content of cobbles ranges from 0 to 15 percent throughout the profile, and the content of stones ranges from 0 to 2 percent throughout the profile. The content of rock fragments averages more than 35 percent in the control section.

The A horizon, if it occurs, has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is gravelly sandy loam, gravelly loamy sand, gravelly sand, cobbly sandy loam, cobbly loamy sand, or cobbly sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. It is dominantly gravelly sandy loam, but the range includes gravelly loamy sand, gravelly sand, cobbly loamy sand, and cobbly sand.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is gravelly sandy loam, gravelly loamy sand, gravelly sand, cobbly sandy loam, cobbly loamy sand, or cobbly sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is very gravelly loamy coarse sand, gravelly coarse sand, gravelly loamy coarse sand, very gravelly coarse sand, cobbly loamy coarse sand, or cobbly coarse sand.

Some pedons have a BC horizon. This horizon has colors similar to those of the Bs2 horizon. It is very gravelly loamy coarse sand, very gravelly coarse sand, or gravelly coarse sand.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. It is very gravelly coarse sand, extremely gravelly coarse sand, or very gravelly sand.

Pelkie Series

The Pelkie series consists of very deep, moderately well drained, rapidly permeable soils on flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 4 percent.

Typical pedon of Pelkie loamy fine sand, in an area of Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes; near Highway M-28 along the Chocolay River; 2,200 feet east and 1,150 feet north of the southwest corner of sec. 9, T. 47 N., R. 23 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 28 minutes 53 seconds N. and long. 87 degrees 19 minutes 04 seconds W.

A—0 to 7 inches; very dark brown (10YR 2/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; moderate very fine subangular blocky structure; friable; many very fine to coarse roots; moderately acid; clear broken boundary.

C1—7 to 19 inches; strong brown (7.5YR 4/6) loamy fine sand; moderate very fine subangular blocky structure; friable; many very fine to coarse roots; slightly acid; clear wavy boundary.

C2—19 to 30 inches; strong brown (7.5YR 5/6) fine sand; weak very fine subangular blocky structure; very friable; neutral; clear wavy boundary.

C3—30 to 80 inches; brown (7.5YR 5/4) sand; single grain; loose; common medium faint brown (7.5YR 4/4) masses of iron accumulation; neutral.

The thickness of the surface layer ranges from 1 to 7 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly loamy fine sand, but the range includes fine sand.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 or 4. It is sand, fine sand, or loamy fine sand.

Pence Series

The Pence series consists of very deep, somewhat excessively drained soils on outwash terraces and outwash plains. These soils formed in a loamy mantle over sandy outwash. Permeability is moderately rapid in the loamy upper part of the profile and rapid or very rapid in the lower part. Slopes range from 0 to 35 percent.

Typical pedon of Pence fine sandy loam, 0 to 6 percent slopes; 100 feet north and 2,300 feet east of the southwest corner of sec. 1, T. 47 N., R. 28 W.; USGS Greenwood topographic quadrangle; lat. 46 degrees 29 minutes 40 seconds N. and long. 87 degrees 45 minutes 04 seconds W.

Oe—0 to 2 inches; black (10YR 2/1), partially decomposed forest litter; very strongly acid; abrupt smooth boundary.

E—2 to 6 inches; brown (7.5YR 4/2) fine sandy loam, pinkish gray (7.5YR 6/2) dry; weak medium subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; very strongly acid; abrupt wavy boundary.

Bs1—6 to 9 inches; dark brown (7.5YR 3/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine to coarse roots; about 5 percent gravel; strongly acid; clear broken boundary.

Bs2—9 to 13 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; about 5 percent gravel; strongly acid; clear wavy boundary.

2Bs3—13 to 16 inches; strong brown (7.5YR 4/6) loamy coarse sand; weak fine subangular blocky structure; very friable; common fine roots; about 5 percent gravel; strongly acid; clear wavy boundary.

2BC—16 to 31 inches; dark yellowish brown (10YR 4/6) coarse sand; single grain; loose; few fine roots; about 6 percent gravel; strongly acid; clear smooth boundary.

2C—31 to 80 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4), stratified coarse sand, sand, very gravelly sand, and very gravelly coarse sand; single grain; loose; about 30 percent gravel; moderately acid.

The thickness of the loamy mantle ranges from 10 to 20 inches. The content of gravel ranges from 2 to 25 percent in the loamy mantle and from 5 to 35 percent in the sandy horizons. The content of cobbles ranges from 0 to 5 percent throughout the profile. The content of rock fragments averages less than 35 percent in the control section.

The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes sandy loam. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

The 2Bs3 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is loamy coarse sand, loamy sand, gravelly loamy coarse sand, or gravelly loamy sand.

The 2BC horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 5 or 6. It is coarse sand, sand, loamy sand, or loamy coarse sand or the gravelly analogs of these textures.

The 2C horizon has hue of 5YR to 10YR and value and chroma of 4 to 6. It is stratified sand, coarse sand, very gravelly coarse sand, and very gravelly sand.

Peshekee Series

The Peshekee series consists of well drained, moderately permeable soils that are shallow to bedrock. These soils are on bedrock-controlled moraines. They formed in a silty or loamy mantle over loamy till overlying igneous or metamorphic bedrock. Slopes range from 6 to 70 percent.

Typical pedon of Peshekee cobbly very fine sandy loam, in an area of Peshekee-Rock outcrop complex, 35 to 70 percent slopes, very bouldery; 2,063 feet east and 908 feet south of the northwest corner of sec. 32, T. 49 N., R. 25 W.; Sugarloaf Mountain; USGS Marquette topographic quadrangle; lat. 46 degrees 36 minutes 10 seconds N. and long. 87 degrees 27 minutes 35 seconds W.

Oa—0 to 1 inch; black (10YR 2/1), well decomposed forest litter; about 15 percent cobbles, 10 percent gravel, 8 percent stones, and 2 percent boulders; very strongly acid; abrupt smooth boundary.

A—1 to 3 inches; dark brown (7.5YR 3/2) cobbly very fine sandy loam, brown (7.5YR 5/2) dry; moderate fine granular structure; friable; about 15 percent cobbles, 10 percent gravel, 8 percent stones, and 2 percent boulders; strongly acid; abrupt wavy boundary.

E—3 to 5 inches; reddish gray (5YR 5/2) cobbly very fine sandy loam, light gray (7.5YR 7/1) dry; moderate fine subangular blocky structure; friable; about 15 percent cobbles, 10 percent gravel, 8 percent stones, and 2 percent boulders; strongly acid; abrupt broken boundary.

Bhs—5 to 8 inches; dark reddish brown (5YR 3/3) cobbly very fine sandy loam; moderate fine subangular blocky structure; friable; about 15 percent cobbles, 10 percent gravel, 8 percent stones, and 2 percent boulders; strongly acid; abrupt broken boundary.

Bs—8 to 14 inches; dark reddish brown (5YR 3/4) cobbly very fine sandy loam; moderate fine and medium subangular blocky structure; friable; about 15 percent cobbles, 10 percent gravel, 8 percent stones, and 2 percent boulders; strongly acid; clear wavy boundary.

2R—14 inches; granite bedrock.

Depth to bedrock ranges from 10 to 20 inches. The content of gravel ranges from 0 to 15 percent throughout the profile, the content of cobbles ranges from 0 to 20 percent throughout the profile, and the content of stones and boulders ranges from 0 to 10 throughout the profile. The content of rock fragments averages less than 35 percent in the control section.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly cobbly very fine sandy loam, but the range includes fine sandy loam and very fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. It is very fine sandy loam, fine sandy loam, or sandy loam or the cobbly analogs of these textures.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is very fine sandy loam, fine sandy loam, or sandy loam or the cobbly analogs of these textures.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is very fine sandy loam, fine sandy loam, or sandy loam or the cobbly analogs of these textures.

The underlying bedrock is igneous or metamorphic.

Pleine Series

The Pleine series consists of very deep, poorly drained, moderately permeable soils in depressions and drainageways on bedrock-controlled moraines. These soils formed in loamy till. Slopes are 0 to 1 percent.

Typical pedon of Pleine very cobbly muck, very stony; about 2 miles southwest of the village of National Mine; 2,370 feet south and 2,565 feet west of the northeast corner of sec. 29, T. 47 N., R. 27 W.; USGS Ishpeming topographic quadrangle; lat. 46 degrees 26 minutes 36 seconds N. and long. 87 degrees 42 minutes 27 seconds W.

Oa—0 to 9 inches; black (N 2.5/0) very cobbly muck; moderate fine granular structure; very friable; many very fine to coarse roots; about 35 percent cobbles and 15 percent stones; slightly acid; abrupt wavy boundary.

Bg—9 to 20 inches; pinkish gray (7.5YR 6/2) very fine sandy loam; weak medium subangular blocky structure; firm; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 10 percent cobbles and 2 percent gravel; slightly acid; clear wavy boundary.

Bw—20 to 33 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common medium prominent pinkish gray (7.5YR 6/2) iron depletions; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 8 percent gravel and 4 percent cobbles; slightly acid; clear wavy boundary.

C—33 to 80 inches; reddish brown (2.5YR 4/4) gravelly sandy loam; massive; friable; about 18 percent gravel, 6 percent cobbles, and 2 percent stones; slightly acid.

The content of gravel ranges from 0 to 15 percent in the Oa, Bg, and Bw horizons and from 15 to 30 percent in the C horizon. The content of cobbles ranges from 5 to 35 percent in the Oa horizon and from 5 to 15 percent in the Bg, Bw, and C horizons. The content of stones ranges from 1 to 15 percent in the Oa horizon and from 1 to 5 percent in the E, B, and C horizons. The content of rock fragments averages less than 35 percent in the control section.

The Oa horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. It is dominantly very cobbly muck, but the range includes muck.

Some pedons have an A horizon. This horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is loam, silt loam, sandy loam, or very fine sandy loam or the cobbly analogs of these textures.

The Bg horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. It is loam, very fine sandy loam, fine sandy loam, or sandy loam or the cobbly analogs of these textures.

The Bw horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam or the cobbly analogs of these textures.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam.

Reade Series

The Reade series consists of moderately well drained, moderately permeable soils that are moderately deep to bedrock (fig. 22). These soils are on ground moraines. They formed in loamy till overlying limestone, dolomite, or dolomitic sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Reade silt loam, in an area of Shoepac-Reade silt loams, 1 to 4 percent slopes; about 4 miles southwest of McFarland; 85 feet north and 1,013 feet west of the southeast corner of sec. 9, T. 43 N., R. 24 W.; USGS Helena topographic quadrangle; lat. 46 degrees 07 minutes 48.33 seconds N. and long. 87 degrees 18 minutes 29.94 seconds W.

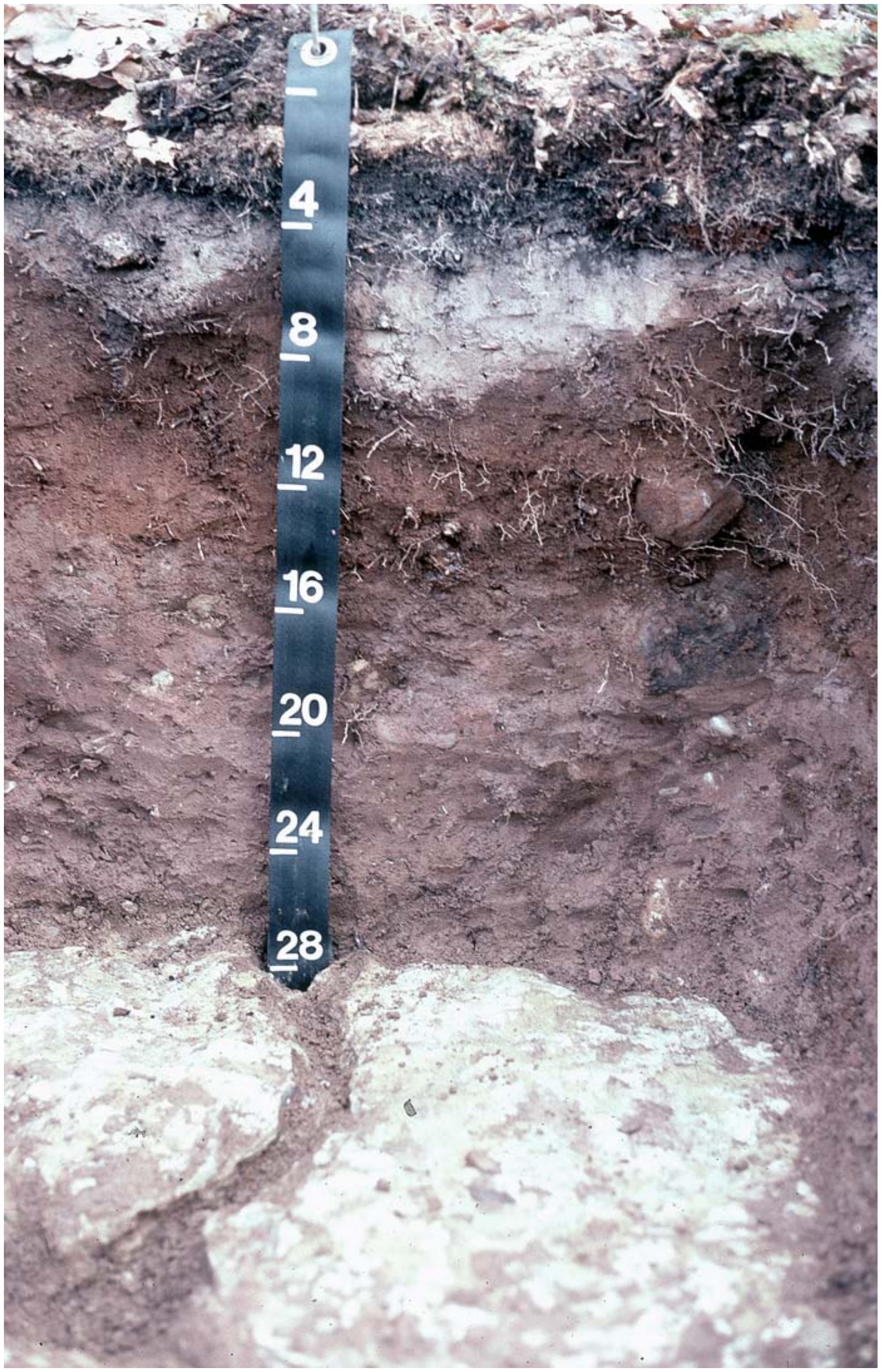


Figure 22.—Typical profile of a Reade soil. Dolomitic sandstone bedrock is at a depth of 28 inches.

Oa—0 to 4 inches; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

E—4 to 7 inches; brown (7.5YR 5/2) silt loam, light gray (7.5YR 7/1) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 5 percent cobbles and 1 percent gravel; extremely acid; clear wavy boundary.

Bhs—7 to 9 inches; dark brown (7.5YR 3/3) loam; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 5 percent cobbles and 3 percent gravel; very strongly acid; clear broken boundary.

Bs1—9 to 12 inches; dark brown (7.5YR 3/4) fine sandy loam; weak fine subangular blocky structure; very friable; common fine and few medium roots; about 5 percent cobbles and 7 percent gravel; very strongly acid; gradual wavy boundary.

Bs2—12 to 15 inches; brown (7.5YR 4/4) fine sandy loam; moderate fine and coarse subangular blocky structure; firm; few very fine and fine roots in cracks 10 to 20 inches apart; common fine vesicular pores; common fine and medium faint dark brown (7.5YR 3/3) masses of iron accumulation; about 5 percent cobbles and 1 percent gravel; strongly acid; clear broken boundary.

B/E—15 to 20 inches; reddish brown (5YR 4/4) fine sandy loam (Bt); few faint dark reddish brown (5YR 3/3) clay films in root channels; occupies about 60 percent of the horizon; surrounded by reddish brown (5YR 5/3) loamy fine sand (E), pinkish gray (7.5YR 7/2) dry; moderate fine and medium subangular blocky structure; friable; few very fine and fine roots; common fine and medium prominent strong brown (7.5YR 4/6) masses of iron accumulation; about 5 percent cobbles and 9 percent gravel; slightly alkaline; gradual wavy boundary.

BC—20 to 28 inches; reddish brown (5YR 4/4) gravelly fine sandy loam; moderate fine and medium subangular blocky structure; friable; few very fine and fine roots; common fine and medium distinct yellowish red (5YR 4/6) masses of iron accumulation; about 5 percent cobbles and 12 percent gravel; moderately alkaline; abrupt smooth boundary.

2R—28 inches; grayish brown (2.5Y 5/2), dolomitic sandstone; few very fine and fine roots in a mat on top and in the upper 6 inches of crevices in the bedrock; many medium and coarse yellowish red (5YR 4/6) masses of iron accumulation on the surface of the bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 15 percent throughout the profile, and the content of cobbles and stones ranges from 0 to 10 percent throughout the profile.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2. It is silt loam, very fine sandy loam, or fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2. It is dominantly silt loam, but the range includes very fine sandy loam and fine sandy loam.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam, loam, very fine sandy loam, or fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs2 horizon has hue of 7.5YR, value of 4, and chroma of 3 or 4. It is fine sandy loam or sandy loam.

The Bt part of the B/E horizon has hue of 5YR, value of 4, and chroma of 3 or 4. It is fine sandy loam. The E part of the B/E horizon has hue of 5YR, value of 5 or 6, and chroma of 3. It is loamy fine sand. Some pedons have an E/B horizon.

The BC horizon has hue of 5YR, value of 4 or 5, and chroma of 4. It is gravelly fine sandy loam. Some pedons have a Cr horizon.

The underlying bedrock is dolomitic sandstone, dolomite, or limestone.

Rousseau Series

The Rousseau series consists of very deep, well drained, rapidly permeable soils on till-floored lake plains and outwash plains. These soils formed in sandy glaciofluvial and glaciolacustrine deposits. Slopes range from 0 to 35 percent.

Typical pedon of Rousseau fine sand, 0 to 6 percent slopes; 500 feet west and 2,400 feet south of the northeast corner of sec. 23, T. 47 N., R. 25 W.; USGS Sands topographic quadrangle; lat. 46 degrees 27 minutes 23 seconds N. and long. 87 degrees 23 minutes 14 seconds W.

A—0 to 3 inches; black (10YR 2/1) fine sand, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; very friable; many uncoated sand grains; common very fine to medium roots; strongly acid; abrupt wavy boundary.

E—3 to 6 inches; brown (7.5YR 5/2) fine sand, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; very friable; few fine to medium roots; strongly acid; abrupt wavy boundary.

Bs1—6 to 14 inches; dark brown (7.5YR 3/4) fine sand; weak medium subangular blocky structure; very friable; few very fine and fine roots; moderately acid; abrupt broken boundary.

Bs2—14 to 27 inches; strong brown (7.5YR 4/6) fine sand; single grain; loose; very few fine roots; vertical tongues of reddish brown (5YR 4/4), moderately cemented ortstein occupy 17 percent (7 of 40 inches) of the horizon and extend to a depth of 25 inches; moderately acid; gradual wavy boundary.

C—27 to 80 inches; brown (7.5YR 5/4) fine sand; single grain; loose; few thin reddish brown (7.5YR 5/4) depositional strata of loamy fine sand; very few fine roots; moderately acid.

The depth to ortstein ranges from 10 to 25 inches.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. It is fine sand.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 1 or 2. It is fine sand.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is fine sand. Some pedons have a BC horizon.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is dominantly fine sand, but in some pedons it has few thin strata of loamy fine sand.

Rubicon Series

The Rubicon series consists of very deep, excessively drained, rapidly permeable soils on outwash plains, disintegration moraines, till-floored lake plains, beach ridges, dissected moraines, and outwash terraces. These soils formed in sandy outwash. Slopes range from 0 to 70 percent.

Typical pedon of Rubicon sand, 0 to 6 percent slopes; 2,000 feet east and 550 feet north of the southwest corner of sec. 26, T. 47 N., R. 25 W.; USGS Sands topographic quadrangle; lat. 46 degrees 26 minutes 09 seconds N. and long. 87 degrees 23 minutes 26 seconds W.

A—0 to 1 inch; black (10YR 2/1) sand, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 3 percent gravel; very strongly acid; abrupt smooth boundary.

E—1 to 7 inches; pinkish gray (7.5YR 6/2) sand, pinkish gray (7.5YR 7/2) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 3 percent gravel; strongly acid; abrupt smooth boundary.

Bs1—7 to 11 inches; brown (7.5YR 4/4) sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; discontinuous vertical tongues of dark reddish brown (5YR 3/2), moderately cemented ortstein occupy 20 percent (8 of 40 inches) of the horizon and extend into the Bs2 horizon to a depth of 16 inches;

tongues are 2 to 5 inches wide and 6 to 30 inches apart; about 3 percent gravel; strongly acid; clear wavy boundary.

Bs2—11 to 18 inches; strong brown (7.5YR 4/6) sand; weak fine subangular blocky structure; very friable; common very fine to coarse roots; discontinuous tongues of dark reddish brown (5YR 3/2), moderately cemented ortstein extend into this horizon from the Bs1 horizon and occupy 12 percent (5 of 40 inches) of the horizon; tongues are 2 to 3 inches wide and 10 to 30 inches apart; about 3 percent gravel; moderately acid; gradual irregular boundary.

BC—18 to 38 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few very fine and fine roots; about 3 percent gravel; moderately acid; clear irregular boundary.

C—38 to 80 inches; light brown (7.5YR 6/4) sand; single grain; loose; few very fine and fine roots; about 3 percent gravel; moderately acid.

The depth to ortstein ranges from 10 to 25 inches. The content of gravel ranges from 0 to 5 percent throughout the profile. The profile is sand throughout.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 or 2.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6.

Sagola Series

The Sagola series consists of very deep, well drained, moderately permeable soils on ground moraines and disintegration moraines. These soils formed in loamy till. Slopes range from 1 to 18 percent.

Typical pedon of Sagola fine sandy loam, in an area of Sagola-Rubicon complex, 6 to 18 percent slopes, bouldery; 1,000 feet west and 100 feet north of the southeast corner of sec. 32, T. 45 N., R. 29 W.; USGS Ralph NW topographic quadrangle; lat. 46 degrees 14 minutes 19 seconds N. and long. 87 degrees 57 minutes 26 seconds W.

Oe—0 to 2 inches; black (N 2.5/0), partially decomposed forest litter.

E—2 to 5 inches; brown (7.5YR 5/2) fine sandy loam, pinkish gray (7.5YR 7/2) dry; weak very fine subangular blocky structure; very friable; many very fine to coarse roots; about 3 percent cobbles and 2 percent gravel; strongly acid; abrupt wavy boundary.

Bs—5 to 20 inches; brown (7.5YR 4/4) fine sandy loam; weak very fine subangular blocky structure; friable; many very fine to coarse roots; about 3 percent cobbles and 2 percent gravel; strongly acid; gradual wavy boundary.

E/B—20 to 35 inches; about 60 percent brown (7.5YR 5/4) loamy sand, pinkish gray (7.5YR 6/2) dry (E); occurring as tongues extending into or completely surrounding isolated remnants of reddish brown (5YR 4/4) sandy loam (Bt); common distinct reddish brown (5YR 4/3) clay films on faces of peds; moderate medium subangular blocky structure; friable; few very fine to coarse roots; common very fine vesicular pores; about 3 percent cobbles and 2 percent gravel; neutral; gradual irregular boundary.

B/E—35 to 56 inches; reddish brown (5YR 4/4) sandy loam (Bt); common distinct reddish brown (5YR 4/3) clay films on faces of peds; occupies about 70 percent of the horizon; penetrated by tongues of brown (7.5YR 5/4) loamy sand, pinkish gray (7.5YR 6/2) dry (E); moderate medium subangular blocky structure; friable; few very fine to coarse roots; few fine vesicular pores; about 3 percent cobbles and 2 percent gravel; neutral; gradual wavy boundary.

C—56 to 80 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; few very fine and fine roots; about 3 percent cobbles and 2 percent gravel; few thin strata of fine sand and sand; slightly effervescent; slightly alkaline.

The depth to carbonates ranges from 50 to 60 inches. The content of gravel ranges from 0 to 10 percent throughout the profile, the content of cobbles ranges from 0 to 5 percent throughout the profile, and the content of stones ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is dominantly fine sandy loam, but the range includes loamy fine sand. Some pedons have an A horizon.

The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is fine sandy loam or loamy fine sand.

The E part of the E/B and B/E horizons has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is loamy sand or loamy fine sand. The Bt part of the E/B and B/E horizons has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The C horizon has hue of 7.5YR, value of 5 or 6, and chroma of 4 to 6. It is sandy loam or loamy sand.

Sauxhead Series

The Sauxhead series consists of moderately well drained, very rapidly permeable soils that are shallow to bedrock. These soils are on bedrock benches. They formed in sandy and channery glaciofluvial deposits overlying sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Sauxhead sandy loam, in an area of Sauxhead-Jacobsville complex, 0 to 6 percent slopes, very stony; 1,200 feet west and 1,400 feet south of the northeast corner of sec. 10, T. 49 N., R. 26 W.; USGS Buckroe topographic quadrangle; lat. 46 degrees 39 minutes 52 seconds N. and long. 87 degrees 39 minutes 05 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; moderate fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—1 to 4 inches; dark reddish gray (5YR 4/2) sandy loam, pinkish gray (5YR 6/2) dry; weak medium subangular blocky structure; friable; many very fine to coarse roots; about 3 percent gravel and 3 percent channers; strongly acid; clear wavy boundary.

2Bw—4 to 14 inches; reddish brown (2.5YR 4/4) very channery loamy sand; weak medium subangular blocky structure; very friable; many very fine to coarse roots; strongly acid; about 50 percent sandstone channers and 5 percent gravel; clear wavy boundary.

3Cr—14 to 17 inches; dark reddish brown (2.5YR 3/4), highly weathered and fractured sandstone; reddish brown (2.5YR 4/4) loamy sand in root channels and cracks; few very fine and fine roots in cracks and crevices; very strongly acid; abrupt wavy boundary.

3R—17 inches; reddish brown (2.5YR 4/4) sandstone bedrock; common medium prominent light brownish gray (10YR 6/2) iron depletions on the surface of the bedrock; common medium prominent reddish yellow (7.5YR 6/8) masses of iron accumulation on the surface of the bedrock.

Depth to bedrock ranges from 10 to 20 inches. The content of channers and gravel ranges from 0 to 20 percent in the A and E horizons and from 35 to 60 percent in the 2Bw horizon. The content of flagstones and cobbles ranges from 0 to 10 percent

throughout the profile. The content of rock fragments averages 35 to 60 percent in the control section.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1. It is sandy loam or loamy sand or the channery or gravelly analogs of these textures.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is dominantly sandy loam, but the range includes loamy sand, channery loamy sand, and gravelly loamy sand.

The 2Bw horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 3 or 4. It is very channery loamy sand or very channery sand.

The 3Cr horizon has hue of 2.5YR, value of 3 or 4, and chroma of 4 to 6. It is soft and weathered sandstone.

The underlying bedrock is sandstone.

Sayner Series

The Sayner series consists of very deep, excessively drained, rapidly permeable soils on outwash plains, outwash terraces, and dissected moraines. These soils formed in sandy and gravelly outwash. Slopes range from 1 to 45 percent.

Typical pedon of Sayner loamy sand, in an area of Sayner-Rubicon complex, 1 to 6 percent slopes; 2,200 feet east and 1,250 feet south of the northwest corner of sec. 14, T. 48 N., R. 26 W.; Dead River Basin; USGS Negaunee topographic quadrangle; lat. 46 degrees 33 minutes 07 seconds N. and long. 87 degrees 31 minutes 20 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—1 to 2 inches; dark reddish gray (5YR 4/2) loamy sand, brown (7.5YR 5/3) dry; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 5 percent gravel and 2 percent cobbles; strongly acid; abrupt broken boundary.

Bs1—2 to 8 inches; dark reddish brown (5YR 3/4) loamy sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 5 percent cobbles; moderately acid; clear wavy boundary.

Bs2—8 to 14 inches; strong brown (7.5YR 4/6) loamy sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 5 percent cobbles; moderately acid; gradual wavy boundary.

BC—14 to 27 inches; strong brown (7.5YR 5/6) sand; weak medium subangular blocky structure parting to weak fine granular; very friable; few very fine to medium roots; about 2 percent cobbles and 1 percent gravel; moderately acid; abrupt smooth boundary.

C—27 to 80 inches; light yellowish brown (10YR 6/4), stratified sand and gravelly sand; single grain; loose; few very fine to medium roots; about 8 percent gravel and 5 percent cobbles; moderately acid.

The content of gravel ranges from 0 to 10 percent in the solum and from 15 to 30 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum. The content of rock fragments averages less than 35 percent in the control section.

The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 or 3. It is loamy sand. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is loamy sand or sand.

The Bs2 horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy sand or sand.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is sand, coarse sand, or loamy sand.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is stratified sand, gravelly sand, and gravelly coarse sand.

Schweitzer Series

The Schweitzer series consists of very deep, well drained soils on bedrock-controlled moraines. These soils are shallow or moderately deep to a fragipan. They formed in silty and loamy eolian deposits over loamy and sandy till. Permeability is moderate in the upper part, very slow in the fragipan, and moderate in the lower part. Slopes range from 6 to 70 percent.

Typical pedon of Schweitzer cobbly very fine sandy loam (fig. 23), in an area of Schweitzer-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very stony; 2,450 feet west and 2,200 feet north of the southeast corner of sec. 12, T. 47 N., R. 27 W.; USGS Palmer topographic quadrangle; lat. 46 degrees 29 minutes 02 seconds N. and long. 87 degrees 37 minutes 19 seconds W.

A—0 to 1 inch; black (5YR 2.5/1) cobbly very fine sandy loam, dark gray (5YR 4/1) dry; weak fine granular structure; very friable; many fine to coarse roots; 17 percent cobbles, 3 percent stones, and 3 percent boulders; extremely acid; abrupt smooth boundary.

E—1 to 5 inches; reddish gray (5YR 5/2) cobbly silt loam, pinkish gray (5YR 6/2) dry; moderate medium subangular blocky structure; friable; many fine to coarse roots; 17 percent cobbles, 3 percent stones, 3 percent boulders, and 2 percent gravel; extremely acid; clear wavy boundary.

Bhs—5 to 8 inches; dark reddish brown (5YR 3/3) cobbly very fine sandy loam; moderate fine and medium subangular blocky structure; friable; many fine to coarse roots; 17 percent cobbles, 3 percent stones, 3 percent boulders, and 1 percent gravel; very strongly acid; clear wavy boundary.

Bs1—8 to 15 inches; dark reddish brown (5YR 3/4) cobbly very fine sandy loam; moderate fine and medium subangular blocky structure; friable; many fine to coarse roots; common fine vesicular pores; 17 percent cobbles, 7 percent gravel, 3 percent stones, and 3 percent boulders; very strongly acid; clear smooth boundary.

Bs2—15 to 21 inches; brown (7.5YR 4/4) cobbly very fine sandy loam; moderate medium platy structure; friable; common fine to medium roots; common very fine and fine vesicular pores; 17 percent cobbles, 3 percent stones, 3 percent boulders, and 1 percent gravel; strongly acid; clear smooth boundary.

2(E/B)x—21 to 27 inches; about 70 percent reddish brown (5YR 4/3) very cobbly loamy sand, light reddish brown (5YR 6/3) dry (E); surrounding isolated remnants of reddish brown (2.5YR 4/4) very cobbly sandy loam (Bt); common distinct reddish brown (2.5YR 4/4) clay films on faces of peds and in pores; weak very coarse prismatic structure parting to moderate thick platy; very firm; many fine vesicular pores; 24 percent cobbles, 22 percent gravel, 3 percent stones, and 3 percent boulders; strongly acid; clear smooth boundary.

2(B/E)x—27 to 43 inches; reddish brown (2.5YR 4/4) very cobbly sandy loam (Bt); many distinct reddish brown (2.5YR 4/4) clay films on faces of peds and in pores; occupies about 80 percent of the horizon; surrounded by reddish brown (5YR 4/3) very cobbly loamy sand, light reddish brown (5YR 6/3) dry (E); weak very coarse prismatic structure parting to moderate thick platy; very firm; many fine vesicular pores; 32 percent cobbles, 18 percent gravel, 3 percent stones, and 3 percent boulders; strongly acid; clear smooth boundary.

Figure 23.—Typical profile of Schweitzer cobbly very fine sandy loam. The fragipan starts below a depth of 50 centimeters.

2(B/E)—43 to 61 inches; reddish brown (2.5YR 4/4) very cobbly sandy loam (Bt); many distinct reddish brown (2.5YR 4/4) clay films on faces of peds and in pores; occupies about 80 percent of the horizon; surrounded by or penetrated by tongues of reddish brown (5YR 4/3) very cobbly loamy sand, light reddish brown (5YR 6/3) dry (E); moderate thick platy structure; firm; many fine vesicular pores; 24 percent cobbles, 20 percent gravel, 3 percent stones, and 3 percent boulders; strongly acid; clear smooth boundary.

2C—61 to 80 inches; reddish brown (2.5YR 4/4) very cobbly loamy sand; massive with weakly expressed thin plates inherent from the parent material; friable; few fine vesicular pores; 24 percent cobbles, 22 percent gravel, 3 percent stones, and 3 percent boulders; moderately acid.

The thickness of the loamy mantle and the depth to the fragipan range from 15 to 30 inches. The content of gravel ranges from 0 to 20 percent in the loamy mantle and from 10 to 40 percent in the fragipan and in the substratum. The content of cobbles ranges from 2 to 20 percent in the loamy mantle and from 4 to 25 percent in the fragipan and in the substratum. The content of stones and boulders ranges from 1 to 10 percent throughout the profile.

Some pedons have an O horizon, which is as much as 2 inches thick. This horizon has hue of 5YR or 7.5YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The A horizon has hue of 5YR or 7.5YR, value of 2 to 4, and chroma of 1 or 2. It is dominantly cobbly very fine sandy loam, but the range includes silt loam, fine sandy loam, very fine sandy loam, cobbly silt loam, and cobbly fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 to 3. It is very fine sandy loam, fine sandy loam, or silt loam or the cobbly analogs of these textures.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bs1 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is silt loam, very fine sandy loam, or fine sandy loam or the cobbly analogs of these textures.

Some pedons have a 2Ex horizon. The 2Ex horizon and the E part of the 2(E/B)x and 2(B/E)x horizons have hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 to 4. Some pedons have a 2Bx horizon. The 2Bx horizon and the B part of the 2(E/B)x and 2(B/E)x horizons have hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. The 2(E/B)x and 2(B/E)x horizons are the cobbly, very cobbly, gravelly, or very gravelly analogs of loamy sand, loamy fine sand, or sandy loam.

Some pedons have a 2Bt horizon. The 2Bt horizon and the B part of the 2(B/E) horizon have hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. The E part of the 2(B/E) horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 to 4. The 2(B/E) horizon is the cobbly, very cobbly, gravelly, or very gravelly analogs of fine sandy loam or sandy loam.

The 2C horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. It is the cobbly, very cobbly, gravelly, or very gravelly analogs of sandy loam, fine sandy loam, or loamy sand.

Shag Series

The Shag series consists of very deep, poorly drained, moderately slowly permeable soils on lake plains. These soils formed in silty glaciolacustrine deposits. Slopes are 0 to 1 percent.

Typical pedon of Shag muck; 470 feet west and 90 feet north of the southeast corner of sec. 21, T. 45 N., R. 27 W.; USGS Green Hills topographic quadrangle; lat. 46 degrees 16 minutes 40.02 seconds N. and long. 87 degrees 41 minutes 08.66 seconds W.

Oa—0 to 2 inches; black (N 2.5/0) muck; moderate fine granular structure; very friable; many very fine to coarse roots; neutral; clear wavy boundary.

A1—2 to 5 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; many very fine to coarse roots; about 5 percent gravel; neutral; clear wavy boundary.

A2—5 to 11 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; many very fine to coarse roots; few fine vesicular pores; common fine distinct strong brown (7.5YR 5/8) masses of iron accumulation; about 5 percent gravel; neutral; clear wavy boundary.

Bw1—11 to 17 inches; brown (7.5YR 4/4) silt loam; weak thin platy structure; friable; common very fine and fine and few medium roots; common fine vesicular pores; common distinct silt coatings on faces of peds; few fine prominent gray (5Y 5/1) iron depletions along root channels; many medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 2 percent gravel; moderately alkaline; gradual wavy boundary.

Bw2—17 to 25 inches; brown (7.5YR 4/4) silt loam; weak medium platy structure; friable; few very fine and fine roots; common fine vesicular pores; common distinct silt coatings on faces of peds; few fine prominent gray (5Y 5/1) iron depletions along root channels; many medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 2 percent gravel; moderately alkaline; gradual wavy boundary.

C—25 to 80 inches; brown (7.5YR 5/3) silt loam; massive with weak very thin platiness inherent from deposition; friable; few very fine roots; common fine vesicular pores; many medium faint strong brown (7.5YR 5/6) masses of iron accumulation; about 2 percent gravel; moderately alkaline.

The content of gravel ranges from 0 to 5 percent throughout the profile, and the content of cobbles ranges from 0 to 2 percent throughout the profile.

The A1 horizon has hue of 7.5YR or 10YR, value of 2, and chroma of 1. It is dominantly silt loam, but the range includes loam.

The A2 horizon has hue of 10YR, value of 3, and chroma of 1. It is silt loam or loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4. It is silt loam or very fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 3 or 4. It is stratified loamy very fine sand, silt loam, and silty clay loam.

Shoepac Series

The Shoepac series consists of very deep, moderately well drained soils on fluted ground moraines. These soils formed in loamy till. Permeability is moderate in the solum and moderately slow in the substratum. Slopes range from 1 to 6 percent.

Typical pedon of Shoepac silt loam, in an area of Shoepac-Trenary silt loams, 1 to 6 percent slopes; 4 miles east of McFarland; 2,300 feet north and 2,100 feet east of the southwest corner of sec. 24, T. 44 N., R. 23 W.; USGS McFarland topographic quadrangle; lat. 46 degrees 11 minutes 39 seconds N. and long. 87 degrees 07 minutes 46 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; very friable; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

E—2 to 6 inches; reddish brown (5YR 5/3) silt loam, pinkish gray (7.5YR 7/2) dry; moderate fine subangular blocky structure; friable; many very fine to coarse roots; 2 percent cobbles and 1 percent gravel; very strongly acid; clear broken boundary.

Bs1—6 to 12 inches; brown (7.5YR 4/4) fine sandy loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; 2 percent cobbles and 1 percent gravel; strongly acid; gradual wavy boundary.

Bs2—12 to 23 inches; strong brown (7.5YR 4/6) loamy sand; weak thick platy structure parting to weak fine subangular blocky; friable; many very fine to coarse roots; 12 percent gravel and 2 percent cobbles; strongly acid; gradual wavy boundary.

E/B—23 to 33 inches; about 75 percent reddish brown (5YR 5/3) loamy sand, pinkish gray (5YR 6/2) dry (E); occurring as tongues extending into or completely surrounding isolated remnants of reddish brown (2.5YR 4/4) fine sandy loam (Bt); weak medium subangular blocky structure; firm; few very fine to medium roots; common medium distinct yellowish red (5YR 5/6) masses of iron accumulation; 3 percent gravel and 2 percent cobbles; strongly acid; gradual irregular boundary.

Bt—33 to 53 inches; reddish brown (2.5YR 4/4) fine sandy loam; weak coarse subangular blocky structure parting to weak medium subangular blocky; firm; few very fine and fine roots; common distinct reddish brown (2.5YR 4/3) clay films on faces of peds and in root channels; 7 percent gravel and 2 percent cobbles; moderately acid; gradual wavy boundary.

C—53 to 80 inches; reddish brown (2.5YR 4/4) gravelly fine sandy loam; massive with weakly expressed thin plates inherited from the parent material; friable; few very fine and fine roots; 22 percent gravel and 4 percent cobbles; slightly effervescent; slightly alkaline.

The depth to carbonates ranges from 35 to 60 inches. The content of gravel ranges from 0 to 15 percent in the solum and from 5 to 25 percent in the substratum. The content of cobbles ranges from 0 to 10 percent throughout the profile. The content of stones ranges from 0 to 2 percent throughout the profile. The total content of rock fragments does not exceed 15 percent in the solum.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is dominantly silt loam, but the range includes very fine sandy loam and fine sandy loam. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is very fine sandy loam or fine sandy loam. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is fine sandy loam, sandy loam, or loamy sand.

The E part of the E/B horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is loamy fine sand, loamy sand, or sandy loam. The Bt part of the E/B horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 3 or 4. It is fine sandy loam or sandy loam. Some pedons have a B/E horizon.

The Bt horizon has hue of 2.5YR or 5YR, value of 4, and chroma of 3 or 4. It is fine sandy loam, sandy loam, or sandy clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is fine sandy loam, sandy loam, gravelly fine sandy loam, or gravelly sandy loam.

Skandia Series

The Skandia series consists of very poorly drained soils that are moderately deep to bedrock. These soils are in depressions and drainageways on sandstone benches. They formed in organic deposits overlying sandstone bedrock. Permeability is moderately slow to moderately rapid. Slopes are 0 to 1 percent.

Typical pedon of Skandia mucky peat, 330 feet south and 2,475 feet east of the northwest corner of sec. 20, T. 51 N., R. 26 W.; USGS Big Bay topographic quadrangle; lat. 46 degrees 48 minutes 18 seconds N. and long. 87 degrees 37 minutes 53 seconds W.

Oe—0 to 4 inches; mucky peat, dark grayish brown (10YR 4/2) broken face and pressed, very dark grayish brown (10YR 3/2) rubbed; about 80 percent fiber, 40

percent rubbed; weak medium platy structure; primarily sphagnum moss fibers; many very fine to coarse roots; extremely acid; clear smooth boundary.

Oa—4 to 26 inches; muck, black (10YR 2/1) broken face, rubbed, and pressed; about 10 percent fiber, 2 percent rubbed; weak medium subangular blocky structure; primarily herbaceous fibers; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

2Cr—26 to 31 inches; dark reddish brown (2.5YR 3/4), weathered sandstone bedrock; massive; firm; extremely acid; clear wavy boundary.

2R—31 inches; dusky red (2.5YR 3/2) sandstone bedrock.

The thickness of the organic layers and the depth to bedrock range from 16 to 51 inches. The organic material is primarily herbaceous. The content of wood fragments ranges up to 15 percent in the form of twigs, branches, or logs in the organic part of the profile.

The surface and subsurface tiers have hue (broken face) of 5YR to 10YR or are neutral in hue. They have value of 2 to 4 and chroma of 0 to 2. The surface tier is dominantly mucky peat, but the range includes muck. The subsurface tier is dominantly muck, but the range includes thin layers of mucky peat.

The 2Cr horizon has hue of 2.5YR, value of 3 or 4, and chroma of 4 to 6. It is soft and weathered sandstone.

The underlying bedrock is sandstone.

Skanee Series

The Skanee series consists of very deep, somewhat poorly drained soils on ground moraines and till-floored lake plains. These soils are shallow to a fragipan. They formed in loamy till. Permeability is moderate in the upper part, very slow in the fragipan, and moderate in the lower part. Slopes range from 0 to 3 percent.

Typical pedon of Skanee cobbly fine sandy loam, 0 to 3 percent slopes, stony; 400 feet east and 100 feet north of the southwest corner of sec. 16, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 27 minutes 51.53 seconds N. and long. 87 degrees 11 minutes 37.11 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

A—2 to 4 inches; very dark gray (7.5YR 3/1) cobbly fine sandy loam, brown (7.5YR 5/2) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 15 percent cobbles and 10 percent gravel; extremely acid; abrupt broken boundary.

E—4 to 7 inches; grayish brown (10YR 5/2) cobbly fine sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation; about 15 percent cobbles and 10 percent gravel; extremely acid; clear broken boundary.

Bs—7 to 12 inches; brown (7.5YR 4/3) sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 7 percent gravel and 4 percent cobbles; extremely acid; clear wavy boundary.

(E/B)x—12 to 14 inches; about 65 percent reddish brown (5YR 5/3) loamy sand, pink (7.5YR 7/3) dry (E); surrounding reddish brown (5YR 4/3) sandy loam (Bt); weak thin platy structure; very firm; few very fine to medium roots 9 to 15 inches apart; common fine vesicular pores; common medium distinct yellowish red (5YR 5/8) masses of iron accumulation; about 6 percent gravel and 2 percent cobbles; extremely acid; gradual wavy boundary.

(B/E)x—14 to 30 inches; reddish brown (5YR 4/3) sandy clay loam (Bt); common distinct reddish brown (2.5YR 4/4) clay films along faces of peds; occupies about

70 percent of the horizon; surrounded by reddish brown (5YR 5/3) fine sandy loam, pink (7.5YR 7/3) dry (E); weak medium platy structure; very firm; few very fine to medium roots in cracks 10 to 20 inches apart; common fine vesicular pores; few distinct sand lenses coating ped faces; common fine distinct yellowish red (5YR 5/8) masses of iron accumulation; about 6 percent gravel and 2 percent cobbles; very strongly acid; abrupt wavy boundary.

C—30 to 80 inches; reddish brown (2.5YR 4/4) sandy loam; massive with weak thin platiness inherent from deposition; friable; about 8 percent gravel, 4 percent cobbles, and 1 percent stones; moderately acid.

Depth to the fragipan ranges from 12 to 20 inches. The content of gravel ranges from 1 to 10 percent throughout the profile. The content of cobbles ranges from 1 to 15 percent above the fragipan and from 0 to 5 percent in the fragipan and in the substratum. The content of stones ranges from 0 to 2 percent throughout the profile.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly cobbly fine sandy loam, but the range includes sandy loam and fine sandy loam.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. It is cobbly fine sandy loam, sandy loam, or loamy sand.

The Bs horizon has hue of 5YR and value and chroma of 3 or 4. It is sandy loam, fine sandy loam, cobbly sandy loam, or cobbly fine sandy loam. Some pedons have a Bhs horizon.

The E part of the (E/B)x and (B/E)x horizons has hue of 5YR, value of 5 or 6, and chroma of 2 to 4. It is sandy loam or loamy sand. The Bt part of the (E/B)x and (B/E)x horizons has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is sandy loam, fine sandy loam, or sandy clay loam. Some pedons have a Bx horizon.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

Solona Series

The Solona series consists of very deep, somewhat poorly drained, moderately permeable soils on ground moraines. These soils formed in loamy till. Slopes range from 0 to 3 percent.

Typical pedon of Solona fine sandy loam, 0 to 3 percent slopes; 250 feet south and 1,200 feet west of the northeast corner of sec. 9, T. 43 N., R. 26 W.; USGS Northland NE topographic quadrangle; lat. 46 degrees 08 minutes 37 seconds N. and long. 87 degrees 33 minutes 28 seconds W.

A—0 to 6 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine to coarse roots; about 4 percent gravel; neutral; clear wavy boundary.

E—6 to 18 inches; brown (7.5YR 5/4) fine sandy loam, pink (7.5YR 7/4) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; common fine prominent light gray (10YR 7/2) iron depletions; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 8 percent gravel and 2 percent cobbles; neutral; gradual wavy boundary.

Bt—18 to 25 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few very fine and fine roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 8 percent gravel and 2 percent cobbles; slightly alkaline; clear wavy boundary.

C—25 to 80 inches; brown (7.5YR 5/4) gravelly fine sandy loam; massive with weakly expressed thick platiness inherent from deposition; friable; few very fine and fine roots; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation;

about 15 percent gravel and 4 percent cobbles; slightly effervescent; slightly alkaline.

The depth to carbonates ranges from 20 to 30 inches. The content of gravel ranges from 2 to 10 percent in the solum and from 10 to 25 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 2 to 8 percent in the substratum.

The A horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is fine sandy loam.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is fine sandy loam or loam.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam, fine sandy loam, or loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is gravelly fine sandy loam.

Spear Series

The Spear series consists of very deep, somewhat poorly drained, moderately slowly permeable soils on lake plains. These soils formed in silty glaciolacustrine deposits. Slopes range from 0 to 3 percent.

Typical pedon of Spear very fine sandy loam, 0 to 3 percent slopes; 560 feet west and 170 feet north of the southeast corner of sec. 21, T. 45 N., R. 27 W.; USGS Green Hills topographic quadrangle; lat. 46 degrees 16 minutes 40.59 seconds N. and long. 87 degrees 41 minutes 14.03 seconds W.

A—0 to 2 inches; dark brown (10YR 3/3) very fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many very fine to coarse roots; about 2 percent cobbles and 2 percent gravel; strongly acid; abrupt smooth boundary.

E—2 to 6 inches; yellowish brown (10YR 5/4) very fine sandy loam, very pale brown (10YR 7/3) dry; moderate fine subangular blocky structure; friable; common very fine to medium roots; common fine vesicular pores; common medium distinct dark brown (10YR 3/3) earthworm casts; common fine distinct dark reddish gray (5YR 4/2) iron depletions; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 2 percent cobbles and 2 percent gravel; strongly acid; clear wavy boundary.

B/E—6 to 31 inches; about 60 percent reddish brown (5YR 4/4) silt loam (Bt); surrounded by yellowish brown (10YR 5/4) very fine sandy loam, very pale brown (10YR 7/3) dry (E); moderate medium platy structure; firm; few very fine to medium roots; common fine vesicular pores; common distinct reddish brown (2.5YR 4/4) clay films on faces of peds and in root channels; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; slightly acid; gradual wavy boundary.

C—31 to 80 inches; brown (7.5YR 4/4), stratified silt loam, silty clay loam, loamy very fine sand, and very fine sandy loam; massive with moderate very thick platiness inherent from deposition; friable; few very fine roots; few fine vesicular pores; common fine distinct grayish brown (10YR 5/2) iron depletions; many medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; slightly acid.

Depth to the argillic horizon ranges from 5 to 25 inches. The content of gravel and the content of cobbles range from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. It is dominantly very fine sandy loam, but the range includes silt loam and loam.

The E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or very fine sandy loam.

The Bt part of the B/E horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is very fine sandy loam or silt loam. The E part of the B/E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. It is very fine sandy loam or silt loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is stratified silt loam, loamy very fine sand, very fine sandy loam, and silty clay loam.

Sporley Series

The Sporley series consists of very deep, well drained, moderately slowly permeable soils on dissected moraines and till-floored lake plains. These soils formed in stratified silty glaciolacustrine deposits. Slopes range from 8 to 35 percent.

Typical pedon of Sporley silt loam, 8 to 35 percent slopes, dissected; 1,900 feet west and 2,600 feet north of the southeast corner of sec. 8, T. 46 N., R. 24 W.; USGS Harvey topographic quadrangle; lat. 46 degrees 24 minutes 03 seconds N. and long. 87 degrees 19 minutes 21 seconds W.

Oe—0 to 2 inches; black (N 2.5/0), partially decomposed leaf litter; common fine and medium roots; moderately acid; abrupt smooth boundary.

E—2 to 6 inches; reddish brown (5YR 5/3) silt loam, pinkish gray (5YR 7/2) dry; weak fine subangular blocky structure; friable; common very fine to coarse roots; moderately acid; abrupt wavy boundary.

Bs1—6 to 10 inches; dark reddish brown (5YR 3/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; moderately acid; clear wavy boundary.

Bs2—10 to 16 inches; strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; moderately acid; clear wavy boundary.

E/B—16 to 33 inches; about 60 percent dark reddish gray (5YR 4/2) very fine sandy loam, pinkish gray (5YR 6/2) dry (E); surrounding isolated remnants of reddish brown (5YR 4/4) silt loam (Bt); common distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds and in root channels; moderate medium subangular blocky structure; firm; few fine and medium roots; many very fine vesicular pores; slightly acid; gradual wavy boundary.

B/E—33 to 45 inches; reddish brown (5YR 4/4) silt loam (Bt); common distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds and in root channels; occupies about 60 percent of the horizon; surrounded by dark reddish gray (5YR 4/2) very fine sandy loam, pinkish gray (5YR 6/2) dry (E); moderate medium subangular blocky structure; firm; few fine roots; many very fine vesicular pores; slightly acid; clear smooth boundary.

C—45 to 80 inches; stratified reddish brown (5YR 5/3) silt, reddish brown (5YR 5/4) silt loam, and dark reddish brown (2.5YR 3/4) silty clay; massive with weak thin platiness inherent from deposition; firm; few very fine vesicular pores; strong effervescence; moderately alkaline.

Depth to the base of the argillic horizon ranges from 30 to 50 inches. The content of gravel ranges from 0 to 2 percent throughout the profile.

The A horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is silt loam or very fine sandy loam.

The E horizon has hue of 5YR, value of 5 or 6, and chroma of 2 or 3. It is dominantly silt loam, but the range includes very fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is silt loam or very fine sandy loam. Some pedons have a Bhs horizon.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or very fine sandy loam.

The E part of the E/B and B/E horizons has hue of 5YR, value of 4 or 5, and chroma of 2 or 3. It is very fine sandy loam. The Bt part of the E/B and B/E horizons has hue of 2.5YR or 5YR, value of 4, and chroma of 3 or 4. It is silt loam.

The C horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 3 to 6. It is stratified silt, silt loam, very fine sandy loam, loamy very fine sand, silty clay, or silty clay loam. Thin strata of loamy fine sand or fine sand are common in some pedons.

Sturgeon Series

The Sturgeon series consists of very deep, somewhat poorly drained soils on low terraces. These soils formed in a silty or loamy mantle over sandy alluvium. Permeability is moderate in the loamy upper part of the profile and rapid in the sandy lower part. Slopes are 0 to 1 percent.

Typical pedon of Sturgeon very fine sandy loam, in an area of Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes; 1,400 feet east and 50 feet north of the southwest corner of sec. 31, T. 51 N., R. 26 W.; USGS Big Bay topographic quadrangle; lat. 46 degrees 45 minutes 59 seconds N. and long. 87 degrees 39 minutes 32 seconds W.

A—0 to 6 inches; dark brown (10YR 3/3) very fine sandy loam, brown (7.5YR 5/2) dry; moderate medium granular structure; friable; many very fine to coarse roots; moderately acid; abrupt smooth boundary.

C1—6 to 24 inches; dark brown (10YR 3/3) and yellowish brown (10YR 5/4) very fine sandy loam; massive with weak thin platiness inherent from deposition; friable; few very fine to coarse roots; thin strata of loamy very fine sand; common medium distinct dark grayish brown (10YR 4/2) iron depletions; common medium prominent yellowish red (5YR 5/8) and strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid; clear smooth boundary.

C2—24 to 35 inches; dark grayish brown (10YR 4/2) very fine sandy loam; massive; friable; few very fine to medium roots; few medium prominent yellowish red (5YR 5/6) and red (2.5YR 4/8) masses of iron accumulation; moderately acid; abrupt smooth boundary.

2C3—35 to 80 inches; brown (10YR 4/3) sand; single grain; loose; moderately acid.

The thickness of the loamy mantle ranges from 18 to 30 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3, and chroma of 2 or 3. It is dominantly very fine sandy loam, but the range includes silt loam.

The C horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. It is stratified very fine sandy loam, silt loam, or loamy very fine sand. It has thin organic strata in some pedons.

The 2C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. It is sand or fine sand. It has thin organic strata in some pedons.

Summerville Series

The Summerville series consists of well drained, moderately permeable soils that are shallow to bedrock. These soils are on ground moraines. They formed in loamy till overlying limestone, dolomite, or dolomitic sandstone bedrock. Slopes range from 1 to 6 percent.

Typical pedon of Summerville fine sandy loam, 1 to 6 percent slopes; 1,300 feet north and 1,200 feet west of the southeast corner of sec. 29, T. 43 N., R. 25 W.; USGS

Arnold topographic quadrangle; lat. 46 degrees 05 minutes 27 seconds N. and long. 87 degrees 27 minutes 19 seconds W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many very fine to coarse roots; moderately acid; abrupt wavy boundary.
Bw—5 to 13 inches; dark brown (7.5YR 3/4) fine sandy loam; moderate medium subangular blocky structure; friable; common very fine to coarse roots; about 5 percent gravel; slightly alkaline; abrupt irregular boundary.
2R—13 inches; pale brown (10YR 6/3) dolomitic sandstone bedrock.

Depth to bedrock ranges from 10 to 20 inches. The content of gravel ranges from 0 to 5 percent throughout the profile, the content of cobbles ranges from 0 to 5 percent throughout the profile, and the content of channers and flagstones ranges from 0 to 15 percent throughout the profile.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is fine sandy loam. Some pedons have an E horizon.

The Bw horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is fine sandy loam or channery fine sandy loam.

The underlying bedrock is dolomitic sandstone, dolomite, or limestone.

Sundell Series

The Sundell series consists of somewhat poorly drained, moderately permeable soils that are moderately deep to bedrock. These soils are on ground moraines. They formed in loamy till overlying limestone, dolomite, or dolomitic sandstone bedrock. Slopes range from 0 to 3 percent.

Typical pedon of Sundell loam, 0 to 3 percent slopes, 1,550 feet east and 1,550 feet north of the southwest corner of sec. 28, T. 42 N., R. 25 W.; USGS Arnold topographic quadrangle; lat. 46 degrees 00 minutes 24 seconds N. and long. 87 degrees 26 minutes 25 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; weak very fine granular structure; very friable; many very fine to coarse roots; moderately acid; abrupt smooth boundary.
A—1 to 8 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; strong fine granular structure; friable; many very fine to coarse roots; few medium distinct grayish brown (10YR 5/2) iron depletions; about 5 percent gravel and 3 percent cobbles; slightly acid; clear wavy boundary.
B/A—8 to 11 inches; about 60 percent brown (7.5YR 5/4) fine sandy loam (B); surrounding peds of black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry (A); moderate fine subangular blocky structure; friable; many very fine to coarse roots; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 5 percent gravel and 3 percent cobbles; common very dark gray (10YR 3/1) wormcasts; neutral; clear wavy boundary.
Bw—11 to 17 inches; brown (7.5YR 4/4) fine sandy loam; weak thin platy structure parting to weak very fine subangular blocky; friable; common very fine to coarse roots; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; about 5 percent gravel and 3 percent cobbles; few very dark gray (10YR 3/1) wormcasts; neutral; clear wavy boundary.
2C—17 to 22 inches; light brown (7.5YR 6/4) gravelly fine sandy loam; massive with weakly expressed thin platiness inherent from deposition; friable; few very fine and fine roots; many fine distinct strong brown (7.5YR 5/6) masses of iron

accumulation; about 16 percent gravel and 8 percent cobbles; moderately alkaline; strong effervescence; abrupt smooth boundary.

2R—22 inches; pale brown (10YR 6/3) dolomite bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 2 to 10 percent in the solum and from 5 to 20 percent in the substratum. The content of cobbles and flagstones ranges from 0 to 5 percent in the solum and from 2 to 10 percent in the substratum.

The A horizon has hue of 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. It is dominantly loam, but the range includes fine sandy loam. Some pedons have an E horizon.

The B part of the B/A horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The A part of the B/A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. This horizon is loam or fine sandy loam.

The Bw horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam or fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4. It is fine sandy loam or gravelly fine sandy loam. Some pedons have a Cr horizon.

The underlying bedrock is limestone, dolomite, or dolomitic sandstone.

Sundog Series

The Sundog series consists of very deep, well drained soils on outwash terraces, disintegration moraines, outwash plains, and bedrock-controlled moraines. These soils formed in a silty or loamy mantle over sandy and gravelly outwash. Permeability is moderate in the loamy upper part of the profile and very rapid in the sandy lower part. Slopes range from 1 to 70 percent.

Typical pedon of Sundog silt loam, 18 to 35 percent slopes; 1,400 feet south and 1,200 feet west of the northeast corner of sec. 20, T. 45 N., R. 30 W.; USGS Witch Lake topographic quadrangle; lat. 46 degrees 17 minutes 09 seconds N. and long. 88 degrees 05 minutes 32 seconds W.

A—0 to 1 inch; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak very fine granular structure; friable; many very fine to coarse roots; about 3 percent gravel; very strongly acid; abrupt smooth boundary.

E—1 to 2 inches; brown (7.5YR 5/2) silt loam, pinkish gray (7.5YR 7/2) dry; weak fine very granular structure; friable; many very fine to coarse roots; about 3 percent gravel; strongly acid; abrupt smooth boundary.

Bs1—2 to 8 inches; brown (7.5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 3 percent gravel; strongly acid; clear wavy boundary.

Bs2—8 to 17 inches; strong brown (7.5YR 4/6) silt loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 3 percent gravel; moderately acid; clear wavy boundary.

Bs3—17 to 22 inches; brown (7.5YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable; common very fine to coarse roots; about 7 percent gravel; moderately acid; gradual wavy boundary.

2C1—22 to 38 inches; dark yellowish brown (10YR 4/4) gravelly sand; single grain; loose; few very fine and fine roots; about 13 percent gravel and 5 percent cobbles; slightly acid; gradual wavy boundary.

2C2—38 to 80 inches; yellowish brown (10YR 5/4), stratified sand and gravelly sand; single grain; loose; few very fine and fine roots; about 13 percent gravel and 5 percent cobbles; slightly acid.

The thickness of the loamy or silty mantle ranges from 18 to 30 inches. The content of gravel ranges from 0 to 15 percent in the A, E, and Bs horizons and from 10 to 50 percent in the C horizons. The content of cobbles ranges from 0 to 10 percent in the A, E, and Bs horizons and from 0 to 15 percent in the C horizons. The content of stones ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly silt loam, but the range includes very fine sandy loam and fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 or 2. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs3 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is very fine sandy loam or fine sandy loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is stratified sand or coarse sand or the gravelly or very gravelly analogs of these textures.

Tawas Series

The Tawas series consists of very deep, very poorly drained soils in depressions and drainageways on outwash plains, till-floored lake plains, ground moraines, disintegration moraines, and bedrock-controlled moraines. These soils formed in organic deposits overlying sandy outwash. Permeability is moderately rapid to moderately slow in the organic part of the profile and rapid in the sandy part. Slopes are 0 to 1 percent.

Typical pedon of Tawas muck, in an area of Carbondale and Tawas soils; 1,650 feet south and 1,950 feet west of the northeast corner of sec. 7, T. 47 N., R. 25 W.; lat. 46 degrees 29 minutes 15.41 seconds N. and long. 87 degrees 28 minutes 38.46 seconds W.

Oa1—0 to 6 inches; muck, black (N 2.5/0) broken face and rubbed; about 5 percent fiber, less than 1 percent rubbed; moderate fine granular structure; many very fine to coarse roots; moderately acid; gradual smooth boundary.

Oa2—6 to 15 inches; muck, black (10YR 2/1) broken face and rubbed; about 25 percent fiber, 5 percent rubbed; weak thin platy structure; moderately acid; clear smooth boundary.

Oa3—15 to 25 inches; muck, black (10YR 2/1) broken face and rubbed; about 90 percent fiber, 15 percent rubbed; weak medium platy structure; moderately acid; abrupt smooth boundary.

Cg—25 to 80 inches; grayish brown (10YR 5/2) sand; single grain; loose; neutral.

The thickness of the organic layers and the depth to the sandy mineral horizon range from 16 to 51 inches. The content of gravel ranges from 0 to 10 percent in the Cg horizon. The organic material is primarily woody. The content of wood fragments ranges up to 15 percent in the form of twigs, branches, or logs in the organic part of the profile.

The surface and subsurface tiers have hue of 5YR to 10YR or are neutral in hue. They have value of 2 or 3 and chroma of 0 to 2. They are dominantly sapric. Some pedons have a fibric surface layer. This layer is 1 to 3 inches thick and is predominantly derived from sphagnum moss.

The Cg horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 1 to 3. It is coarse sand, sand, loamy sand, or fine sand.

Tokiahok Series

The Tokiahok series consists of very deep, well drained soils that are moderately deep to a fragipan. These soils are on ground moraines, till-floored lake plains, and end moraines. They formed in sandy outwash over loamy till. Permeability is rapid in the upper part, very slow in the fragipan, and moderate in the lower part. Slopes range from 8 to 70 percent.

Typical pedon of Tokiahok loamy fine sand, in an area of Frohling-Tokiahok complex, 8 to 35 percent slopes, dissected, very stony; 250 feet south and 2,112 feet east of the northwest corner of sec. 31, T. 52 N., R. 29 W.; USGS McComb Corner topographic quadrangle; lat. 46 degrees 51 minutes 27 seconds N. and long. 88 degrees 22 minutes 22 seconds W.

Oa—0 to 2 inches; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many fine and common medium roots; very strongly acid; abrupt smooth boundary.

E—2 to 11 inches; reddish gray (5YR 5/2) loamy fine sand, pinkish gray (5YR 7/2) dry; weak fine subangular blocky structure; very friable; many fine and common medium roots; about 5 percent gravel; very strongly acid; clear wavy boundary.

Bhs—11 to 15 inches; dark reddish brown (5YR 3/3) loamy fine sand; weak fine subangular blocky structure; friable; many fine and common medium roots; discontinuous tongues of dark reddish brown (5YR 3/3) and reddish brown (5YR 4/4), moderately cemented ortstein occupy 20 percent (8 of 40 inches) of the horizon; tongues are 2 to 4 inches wide and 8 to 22 inches apart and extend into the Bs horizon; about 5 percent gravel and 1 percent cobbles; strongly acid; clear irregular boundary.

Bs—15 to 24 inches; brown (7.5YR 4/4) loamy fine sand; weak fine subangular blocky structure; very friable; few fine and medium roots; ortstein occupies 10 percent (4 of 40 inches) of the horizon and extends to a depth of 24 inches; about 5 percent gravel and 1 percent cobbles; strongly acid; gradual wavy boundary.

2Bx—24 to 30 inches; strong brown (7.5YR 4/6) fine sandy loam; moderate medium subangular blocky structure; very firm; very few fine and medium roots in cracks 10 to 20 inches apart; common very fine and fine vesicular pores; about 10 percent gravel and 2 percent cobbles; moderately acid; clear wavy boundary.

2(E/B)x—30 to 41 inches; about 80 percent reddish brown (5YR 5/3) loamy sand, pinkish gray (5YR 7/2) dry (E); surrounding isolated remnants of reddish brown (2.5YR 4/4) sandy loam (Bt); weak medium platy structure parting to weak very fine subangular blocky; very firm; very few fine roots in cracks 10 to 20 inches apart; common very fine and fine vesicular pores; about 5 percent gravel and 2 percent cobbles; moderately acid; gradual wavy boundary.

2(B/E)x—41 to 49 inches; reddish brown (2.5YR 4/4) sandy loam (Bt); few distinct dusky red (2.5YR 3/2) clay films on faces of peds; occupies about 80 percent of the horizon; surrounding peds of reddish brown (5YR 5/3) loamy sand, pinkish gray (5YR 7/2) dry (E); weak medium platy structure parting to weak very fine subangular blocky; very firm; very few fine roots in cracks 10 to 20 inches apart; common very fine and fine vesicular pores; about 5 percent gravel and 2 percent cobbles; slightly acid; clear smooth boundary.

2Btx—49 to 59 inches; dark reddish brown (2.5YR 3/4) sandy loam; weak medium platy structure parting to weak very fine subangular blocky; very firm; common very fine and fine vesicular pores; common distinct dusky red (2.5YR 3/2) clay films on faces of peds; about 5 percent gravel and 2 percent cobbles; slightly acid; gradual wavy boundary.

2BC—59 to 66 inches; reddish brown (2.5YR 4/4) sandy loam; weak fine subangular blocky structure; friable; about 5 percent gravel and 2 percent cobbles; slightly acid; gradual wavy boundary.

2C—66 to 80 inches; reddish brown (2.5YR 4/4) sandy loam; massive; friable; about 10 percent gravel and 2 percent cobbles; slightly acid.

Depth to the fragipan ranges from 20 to 40 inches. The content of gravel ranges from 1 to 15 percent throughout the profile, and the content of cobbles and stones ranges from 0 to 5 percent.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3. It is dominantly loamy fine sand, but the range includes loamy sand, sand, and fine sand. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is loamy sand, loamy fine sand, sand, or fine sand.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is loamy sand, loamy fine sand, sand, or fine sand.

The 2Bx horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The E part of the 2(E/B)x and 2(B/E)x horizons has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is loamy sand or loamy fine sand. The Bt part of the 2(E/B)x and 2(B/E)x horizons and the 2Btx horizon have hue of 2.5YR or 5YR and value and chroma of 3 or 4. They are sandy loam or fine sandy loam.

The 2BC and 2C horizons have hue of 2.5YR or 5YR and value and chroma of 3 or 4. They are sandy loam or fine sandy loam.

Traunik Series

The Traunik series consists of very deep, well drained soils on outwash terraces. These soils formed in a loamy mantle over gravelly and sandy outwash deposits. Permeability is moderate in the loamy mantle and very rapid in the sandy lower part of the profile. Slopes range from 1 to 6 percent.

Typical pedon of Traunik gravelly fine sandy loam (fig. 24), 1 to 6 percent slopes; 850 feet north and 2,400 feet west of the southeast corner of sec. 24, T. 45 N., R. 23 W.; 1/2 mile west of the Alger County line and 1/2 mile north of Huber Creek; USGS Ladoga topographic quadrangle; lat. 46 degrees 16 minutes 38.98 seconds N. and long. 87 degrees 07 minutes 38.27 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; strongly acid; abrupt smooth boundary.

E—1 to 4 inches; brown (7.5YR 4/2) gravelly fine sandy loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 15 percent gravel and 10 percent cobbles; strongly acid; clear wavy boundary.

Bs1—4 to 11 inches; dark brown (7.5YR 3/4) gravelly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 15 percent gravel and 10 percent cobbles; strongly acid; gradual wavy boundary.

2Bs2—11 to 24 inches; brown (7.5YR 4/4) very gravelly sand; weak very fine subangular blocky structure; loose; common very fine to coarse roots; 41 percent gravel and 16 percent cobbles; moderately acid; gradual wavy boundary.

2BC—24 to 31 inches; dark yellowish brown (10YR 4/4) very gravelly sand; single grain; loose; common very fine to coarse roots; 45 percent gravel and 13 percent cobbles; slightly acid; gradual wavy boundary.

2C—31 to 80 inches; pale brown (10YR 6/3) very gravelly sand; single grain; loose; few very fine to medium roots; 45 percent gravel and 13 percent cobbles; slightly effervescent; slightly alkaline.

The thickness of the loamy mantle ranges from 5 to 15 inches. The content of gravel ranges from 5 to 20 percent in the loamy mantle and from 5 to 50 percent in the sandy

Figure 24.—Typical profile of Traunik gravelly fine sandy loam. This soil is a probable source of gravel. Depth is marked in inches.

lower part of the profile. The content of cobbles ranges from 0 to 15 percent in the loamy upper part of the profile and from 0 to 20 percent in the sandy lower part. The content of stones ranges from 0 to 5 percent throughout the profile. The content of rock fragments averages between 35 and 60 percent in the particle-size control section.

The E horizon has hue of 7.5YR, value of 4 or 5, and chroma of 1 or 2. It is dominantly gravelly fine sandy loam, but the range includes cobbly fine sandy loam and fine sandy loam.

The Bs1 horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4. It is gravelly fine sandy loam, gravelly sandy loam, cobbly fine sandy loam, or cobbly sandy loam.

The 2Bs2 horizon has hue of 7.5YR and value and chroma of 4. It is very gravelly sand or very gravelly loamy sand or the gravelly, cobbly, or very cobbly analogs of sand or loamy sand.

The 2BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is very gravelly sand, gravelly sand, very cobbly sand, or cobbly sand. In some pedons it has thin layers of sand.

The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is very gravelly sand, gravelly sand, cobbly sand, or very cobbly sand. In some pedons it has thin layers of sand.

Trenary Series

The Trenary series consists of very deep, well drained, moderately permeable soils on ground moraines. These soils formed in loamy till. Slopes range from 1 to 18 percent.

Typical pedon of Trenary silt loam, 6 to 18 percent slopes; 3,400 feet north and 450 feet east of the southwest corner of sec. 35, T. 44 N., R. 23 W.; USGS McFarland topographic quadrangle; lat. 46 degrees 10 minutes 06.07 seconds N. and long. 87 degrees 09 minutes 22.01 seconds W.

Oa—0 to 1 inch; black (10YR 2/1), well decomposed forest litter; many very fine to coarse roots; about 2 percent gravel; abrupt smooth boundary.

E—1 to 5 inches; reddish gray (5YR 5/2) silt loam, light gray (7.5YR 7/1) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; extremely acid; abrupt smooth boundary.

Bhs—5 to 7 inches; dark reddish brown (5YR 3/3) silt loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; extremely acid; clear broken boundary.

Bs—7 to 15 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; many very fine to coarse roots; about 4 percent gravel and 2 percent cobbles; very strongly acid; clear wavy boundary.

2(E/B)x—15 to 21 inches; about 60 percent brown (7.5YR 5/4) fine sandy loam, pinkish gray (7.5YR 7/2) dry (E); surrounding isolated remnants of reddish brown (5YR 4/4) fine sandy loam (Bt); weak thin platy structure parting to weak very fine subangular blocky; very firm; common very fine to medium roots; common fine vesicular pores; about 8 percent gravel and 2 percent cobbles; strongly acid; gradual wavy boundary.

2(E/B)—21 to 34 inches; about 60 percent reddish brown (2.5YR 5/3) loamy fine sand, white (7.5YR 8/1) dry (E); surrounding isolated remnants of reddish brown (2.5YR 4/4) fine sandy loam (Bt); common distinct red (2.5YR 4/6) clay films on faces of peds; weak thin platy structure parting to weak very fine subangular blocky; friable; common very fine to medium roots; few fine vesicular pores; about 10 percent gravel and 2 percent cobbles; strongly acid; gradual irregular boundary.

2(B/E)—34 to 48 inches; reddish brown (2.5YR 4/4) fine sandy loam (Bt); common distinct red (2.5YR 4/6) clay films on faces of peds; occupies about 60 percent of the horizon; surrounded by reddish brown (2.5YR 5/3) loamy fine sand, white (7.5YR 8/1) dry (E); weak thin platy structure parting to weak very fine subangular blocky; friable; few very fine and fine roots; few fine vesicular pores; about 10 percent gravel and 2 percent cobbles; neutral; gradual wavy boundary.

2C—48 to 80 inches; reddish brown (2.5YR 5/4) cobbly fine sandy loam; massive; friable; about 15 percent gravel, 12 percent cobbles, and 2 percent stones; slightly effervescent; moderately alkaline.

The depth to carbonates ranges from 30 to 50 inches. The content of gravel ranges from 1 to 10 percent in the solum and from 5 to 20 percent in the substratum. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the substratum. The content of stones ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2. It is dominantly silt loam, but the range includes very fine sandy loam and fine sandy loam. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is silt loam, very fine sandy loam, or fine sandy loam.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is very fine sandy loam or fine sandy loam.

The E part of the 2(E/B)x, 2(E/B), and 2(B/E) horizons has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loamy fine sand, fine sandy loam, loamy sand, or sandy loam. The Bt part of the 2(E/B)x, 2(E/B), and 2(B/E) horizons has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 3 to 6. It is fine sandy loam or sandy clay loam. Some pedons have a Bt horizon.

The 2C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4. It is fine sandy loam, gravelly fine sandy loam, or cobbly fine sandy loam.

Tula Series

The Tula series consists of very deep, somewhat poorly drained soils on bedrock-controlled moraines. These soils formed in a silty or loamy mantle over loamy till. They are shallow or moderately deep to a fragipan. Permeability is moderate in the upper part, very slow in the fragipan, and moderate in the lower part. Slopes range from 0 to 3 percent.

Typical pedon of Tula cobbly very fine sandy loam, 0 to 3 percent slopes, very stony; near National Mine; 2,340 feet west and 2,525 feet south of the northeast corner of sec. 29, T. 47 N., R. 27 W.; USGS Ishpeming topographic quadrangle; lat. 46 degrees 26 minutes 34 seconds N. and long. 87 degrees 42 minutes 24 seconds W.

Oa—0 to 1 inch; black (5YR 2.5/1), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; about 2 percent stones; strongly acid; abrupt wavy boundary.

A—1 to 5 inches; dark reddish gray (5YR 4/2) cobbly very fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium platy structure; friable; common very fine to coarse roots; about 20 percent cobbles and 10 percent gravel; strongly acid; clear wavy boundary.

E—5 to 8 inches; light gray (5YR 7/1) cobbly very fine sandy loam, white (5YR 8/1) dry; moderate medium platy structure; friable; common very fine to coarse roots; common medium distinct gray (5YR 5/1) iron depletions; common medium distinct light reddish brown (5YR 6/4) masses of iron accumulation; about 20 percent cobbles and 10 percent gravel; moderately acid; gradual irregular boundary.

Bs1—8 to 20 inches; reddish brown (5YR 4/4) cobbly very fine sandy loam; moderate thin platy structure; friable; common very fine to coarse roots; few fine distinct yellowish red (5YR 5/8) masses of iron accumulation; about 20 percent cobbles and 10 percent gravel; moderately acid; clear irregular boundary.

2Bs2—20 to 28 inches; dark reddish brown (5YR 3/4) gravelly sandy loam; weak medium subangular blocky structure; friable; common very fine to medium roots;

about 12 percent gravel, 6 percent cobbles, and 5 percent stones; moderately acid; clear wavy boundary.

2(E/B)x—28 to 37 inches; about 60 percent light reddish brown (5YR 6/3) gravelly sandy loam, pinkish gray (5YR 7/2) dry (E); surrounding isolated remnants of reddish brown (5YR 4/3) gravelly sandy loam (Bt); few distinct clay films on faces of peds; weak very coarse prismatic structure parting to weak thin platy; very firm; few very fine and fine roots in cracks 10 to 20 inches apart; common fine vesicular pores; few fine distinct yellowish red (5YR 5/8) masses of iron accumulation; about 12 percent gravel, 6 percent cobbles, and 5 percent stones; moderately acid; gradual wavy boundary.

2(B/E)x—37 to 62 inches; dark reddish brown (2.5YR 3/4) gravelly loam (Bt); common distinct dark reddish brown (2.5YR 3/3) clay films on faces of peds; occupies about 60 percent of the horizon; surrounded by reddish brown (5YR 5/4) gravelly sandy loam, pink (7.5YR 7/3) dry (E); weak very coarse prismatic structure parting to weak thin platy; very firm; common fine vesicular pores; few fine distinct yellowish red (5YR 5/8) masses of iron accumulation; about 12 percent gravel, 6 percent cobbles, and 5 percent stones; moderately acid; gradual wavy boundary.

2C—62 to 80 inches; reddish brown (2.5YR 4/4) gravelly sandy loam; massive; friable; about 22 percent gravel, 8 percent cobbles, and 3 percent stones; moderately acid.

Depth to the fragipan ranges from 15 to 30 inches. The content of gravel ranges from 1 to 15 percent above the fragipan and from 10 to 25 percent in the fragipan and in the substratum. The content of cobbles ranges from 5 to 20 percent above the fragipan and from 5 to 16 percent in the fragipan and in the substratum. The content of stones ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR or 7.5YR, value of 2 to 4, and chroma of 1 or 2. It is dominantly cobbly very fine sandy loam, but the range includes cobbly fine sandy loam.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 1 or 2. It is cobbly very fine sandy loam or cobbly fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is cobbly very fine sandy loam or cobbly fine sandy loam.

The 2Bs2 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is gravelly sandy loam or gravelly fine sandy loam.

The E part of the 2(E/B)x and 2(B/E)x horizons has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 or 3. It is gravelly loamy sand or gravelly sandy loam. The Bt part of the 2(E/B)x and 2(B/E)x horizons has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is gravelly sandy loam or gravelly loam.

The 2C horizon has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is gravelly sandy loam.

Vanriper Series

The Vanriper series consists of very deep, well drained, moderately permeable soils on disintegration moraines and bedrock-controlled moraines. These soils formed in a silty or loamy eolian mantle over very cobbly loamy till. Slopes range from 1 to 45 percent.

Typical pedon of Vanriper very cobbly silt loam, 18 to 45 percent slopes, very bouldery; south of Lake Michigamme; 2,600 feet north and 1,800 feet west of the southeast corner of sec. 6, T. 47 N., R. 30 W.; USGS Witch Lake NE topographic quadrangle; lat. 46 degrees 29 minutes 59 seconds N. and long. 88 degrees 06 minutes 09 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; weak fine granular structure; very friable; many very fine to coarse roots; abrupt smooth boundary.
E—1 to 3 inches; brown (7.5YR 4/2) very cobbly silt loam, pinkish gray (7.5YR 6/2) dry; weak medium granular structure; friable; many very fine to coarse roots; about 19 percent cobbles, 10 percent gravel, 10 percent stones, and 6 percent boulders; extremely acid; abrupt smooth boundary.
Bs1—3 to 11 inches; dark brown (7.5YR 3/4) very cobbly very fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 19 percent cobbles, 10 percent stones, 10 percent gravel, and 6 percent boulders; very strongly acid; clear wavy boundary.
Bs2—11 to 20 inches; dark yellowish brown (10YR 4/4) very cobbly very fine sandy loam; weak fine subangular blocky structure; friable; common very fine to coarse roots; about 19 percent cobbles, 18 percent gravel, 10 percent stones, and 6 percent boulders; very strongly acid; gradual wavy boundary.
C—20 to 80 inches; olive brown (2.5Y 4/3) very cobbly fine sandy loam; massive; friable; few very fine and fine roots; about 19 percent cobbles, 18 percent gravel, 10 percent stones, and 6 percent boulders; strongly acid.

The content of gravel ranges from 5 to 40 percent throughout the profile, the content of cobbles ranges from 5 to 30 percent throughout the profile, and the content of stones and boulders ranges from 1 to 30 percent throughout the profile. The content of rock fragments averages more than 35 percent in the control section.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. It is the cobbly, very cobbly, or very stony analogs of silt loam, very fine sandy loam, or fine sandy loam.

The E horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1 to 3. It is dominantly very cobbly silt loam, but the range includes the cobbly, very cobbly, and very stony analogs of very fine sandy loam and fine sandy loam.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is the very cobbly, very stony, or cobbly analogs of silt loam, very fine sandy loam, or fine sandy loam.

The Bs2 horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 4 to 6. It is very cobbly very fine sandy loam, very cobbly silt loam, very cobbly fine sandy loam, or the cobbly, stony, or very stony analogs of very fine sandy loam, silt loam, or fine sandy loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3. It is the very cobbly, very gravelly, or very stony analogs of fine sandy loam or sandy loam.

Voelker Series

The Voelker series consists of very deep, well drained soils on dissected moraines and till-floored lake plains. These soils are shallow to ortstein. They formed in sandy outwash and in the underlying loamy glaciolacustrine deposits. Permeability is rapid in the upper part, moderate or moderately rapid in the ortstein, and moderately slow in the loamy lower part. Slopes range from 1 to 70 percent.

Typical pedon of Voelker fine sand, in an area of Garlic-Alcona-Voelker complex, 8 to 35 percent slopes, dissected; 330 feet west and 1,166 feet south of the northeast corner of sec. 31, T. 50 N., R. 26 W.; USGS Buckroe topographic quadrangle; lat. 46 degrees 41 minutes 24 seconds N. and long. 87 degrees 35 minutes 40 seconds W.

Oa—0 to 1 inch; black (N 2.5/0), well decomposed forest litter; moderate fine granular structure; very friable; abrupt smooth boundary.
A—1 to 5 inches; dark gray (7.5YR 4/1) fine sand, gray (7.5YR 6/1) dry; weak very fine granular structure; very friable; many very fine to coarse roots; very strongly acid; clear wavy boundary.

E—5 to 11 inches; reddish gray (5YR 5/2) fine sand, pinkish gray (5YR 7/2) dry; weak very fine subangular blocky structure; very friable; many very fine to coarse roots; very strongly acid; abrupt irregular boundary.

Bhs—11 to 15 inches; dark reddish brown (5YR 3/2) fine sand; massive; very hard; strongly cemented ortstein occupies 70 percent of the horizon and occurs as tongues extending to a depth of 25 inches; many very fine to coarse roots; very strongly acid; clear irregular boundary.

Bsm1—15 to 23 inches; dark reddish brown (5YR 3/4) and reddish brown (5YR 4/4) fine sand; massive; very hard; ortstein occupies 100 percent of the horizon and is strongly cemented; ortstein occurs as a nearly continuous layer; few very fine and fine roots in cracks; strongly acid; clear wavy boundary.

Bsm2—23 to 31 inches; brown (7.5YR 5/4) fine sand; massive; very hard; ortstein occupies 90 percent of the horizon and is moderately cemented; few very fine and fine roots; strongly acid; gradual wavy boundary.

2E/B—31 to 39 inches; 80 percent brown (7.5YR 5/3) loamy very fine sand, gray (7.5YR 6/2) dry (E); surrounding peds of reddish brown (5YR 4/4) very fine sandy loam (Bt); weak thin platy structure; firm; few very fine and fine roots; strongly acid; gradual wavy boundary.

2C1—39 to 54 inches; stratified reddish brown (5YR 5/4) loamy very fine sand and reddish brown (5YR 4/4) very fine sandy loam and silt loam; massive with weakly expressed thin platiness inherent from the parent material; firm; common fine vesicular pores; few very fine and fine roots; strongly acid; gradual wavy boundary.

2C2—54 to 80 inches; brown (7.5YR 5/3), stratified sand, very fine sand, and silt loam; massive; friable to loose; few very fine and fine roots; strongly acid.

The depth to ortstein ranges from 6 to 12 inches. The depth to the loamy substratum ranges from 24 to 40 inches. The content of gravel ranges from 0 to 2 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1. It is dominantly fine sand, but the range includes sand, loamy sand, and loamy fine sand.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It is sand, fine sand, loamy sand, or loamy fine sand.

The Bhs horizon has hue of 5YR or 7.5YR, value of 2.5 or 3, and chroma of 2 or 3. It is sand, fine sand, loamy sand, or loamy fine sand.

The Bsm1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is sand, fine sand, loamy sand, or loamy fine sand.

The Bsm2 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is sand, fine sand, loamy sand, or loamy fine sand.

The E part of the 2E/B horizon has hue of 7.5YR, value of 5 or 6, and chroma of 3 or 4. It is loamy fine sand or loamy very fine sand. The Bt part of the 2E/B horizon has hue of 5YR, value of 4 or 5, and chroma of 4 to 6. It is loamy very fine sand, fine sandy loam, or very fine sandy loam.

The 2C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is stratified silt loam, very fine sandy loam, loamy very fine sand, very fine sand, and fine sand.

Wabeno Series

The Wabeno series consists of very deep, moderately well drained soils on disintegration moraines. These soils are moderately deep to a fragipan. They formed in a silty or loamy mantle over loamy till. Permeability is moderate in the silty upper part of the profile, slow in the fragipan, and moderate in the substratum. Slopes range from 1 to 18 percent.

Typical pedon of Wabeno silt loam, in an area of Goodman-Sundog-Wabeno silt loams, 1 to 6 percent slopes, bouldery; 2,150 feet south and 1,000 feet east of the northwest corner of sec. 28, T. 46 N., R. 30 W.; near Grant Lake; USGS Witch Lake topographic quadrangle; lat. 46 degrees 21 minutes 23 seconds N. and long. 88 degrees 04 minutes 16 seconds W.

Oe—0 to 1 inch; black (5YR 2.5/1), partially decomposed forest litter; very strongly acid; abrupt smooth boundary.

E—1 to 3 inches; pinkish gray (5YR 6/2) silt loam, light gray (5YR 7/1) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 3 percent gravel and 1 percent cobbles; very strongly acid; abrupt smooth boundary.

Bs1—3 to 13 inches; reddish brown (5YR 4/4) silt loam; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 3 percent gravel and 1 percent cobbles; strongly acid; gradual wavy boundary.

Bs2—13 to 23 inches; yellowish red (5YR 4/6) silt loam; moderate fine subangular blocky structure; friable; common very fine to medium roots; about 3 percent gravel and 1 percent cobbles; moderately acid; gradual wavy boundary.

E/B—23 to 29 inches; about 75 percent brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry (E); occurs as tongues extending into or completely surrounding isolated remnants of brown (7.5YR 4/4) silt loam (B); moderate medium subangular blocky structure; friable; common very fine to medium roots; common fine vesicular pores; many medium prominent yellowish red (5YR 5/8) masses of iron accumulation; about 5 percent gravel and 1 percent cobbles; moderately acid; gradual wavy boundary.

2(B/E)x—29 to 57 inches; dark brown (7.5YR 3/4) sandy loam (Bt); common distinct dark reddish brown (5YR 3/4) clay films on faces of peds; occupies about 55 percent of the horizon; surrounded by brown (7.5YR 5/4) loamy sand, pinkish gray (7.5YR 6/2) dry (E); weak thin platy structure; very firm; common fine vesicular pores; common medium distinct yellowish red (5YR 5/8) masses of iron accumulation; about 6 percent gravel and 3 percent cobbles; slightly acid; gradual wavy boundary.

2C—57 to 80 inches; brown (7.5YR 4/4) sandy loam; massive; friable; about 6 percent gravel and 3 percent cobbles; slightly acid.

The thickness of the silty mantle and the depth to the fragipan range from 20 to 32 inches. The content of gravel ranges from 1 to 5 percent above the fragipan and from 5 to 15 percent in the fragipan and in the substratum. The content of cobbles ranges from 0 to 5 percent above the fragipan and from 0 to 8 percent in the fragipan and in the substratum. The content of stones ranges from 0 to 2 percent throughout the profile.

The E horizon has hue of 5YR, value of 5 or 6, and chroma of 2 or 3. It is silt loam. Some pedons have an A horizon.

The Bs1 horizon has hue of 5YR, value of 3 or 4, and chroma of 4. It is silt loam.

The Bs2 horizon has hue of 5YR, value of 4, and chroma of 4 to 6. It is silt loam.

The E part of the E/B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2. The B part of the E/B horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4. The E/B horizon is silt loam.

The Bt part of the 2(B/E)x horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam. The E part of the 2(B/E)x horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. It is loamy sand, sandy loam, or fine sandy loam or the gravelly analogs of these textures. Some pedons have a BC horizon.

The 2C horizon has hue of 7.5YR, value of 3 or 4, and chroma of 4. It is sandy loam or gravelly sandy loam.

Waiska Series

The Waiska series consists of very deep, excessively drained, very rapidly permeable soils on outwash plains, outwash terraces, bedrock benches, and dissected moraines. These soils formed in gravelly and sandy outwash. Slopes range from 0 to 70 percent.

Typical pedon of Waiska cobbly loamy sand, in an area of Kalkaska-Waiska complex, 1 to 6 percent slopes; 1,000 feet west and 3,300 feet north of the southeast corner of sec. 8, T. 47 N., R. 25 W.; near gravel pits on County Road 480; USGS Sands topographic quadrangle; lat. 46 degrees 29 minutes 12 seconds N. and long. 87 degrees 27 minutes 08 seconds W.

A—0 to 1 inch; black (10YR 2/1) cobbly loamy sand, dark gray (10YR 4/1) dry; moderate fine granular structure; very friable; many very fine to coarse roots; about 15 percent cobbles and 10 percent gravel; moderately acid; abrupt smooth boundary.

E—1 to 4 inches; reddish gray (5YR 5/2) cobbly loamy sand, gray (5YR 6/1) dry; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 15 percent cobbles and 10 percent gravel; strongly acid; abrupt smooth boundary.

Bhs—4 to 8 inches; dark reddish brown (5YR 3/3) very cobbly loamy sand; weak fine subangular blocky structure; friable; many very fine to coarse roots; about 20 percent cobbles and 20 percent gravel; moderately acid; clear wavy boundary.

Bs1—8 to 14 inches; reddish brown (5YR 4/4) very cobbly loamy sand; weak fine subangular blocky structure; very friable; many very fine to coarse roots; about 30 percent gravel and 20 percent cobbles; moderately acid; gradual wavy boundary.

Bs2—14 to 36 inches; yellowish red (5YR 4/6) very cobbly sand; single grain; loose; common very fine to medium roots; about 30 percent gravel and 20 percent cobbles; moderately acid; gradual wavy boundary.

C—36 to 80 inches; brown (7.5YR 5/4) very gravelly sand; single grain; loose; few very fine and fine roots; about 50 percent gravel and 10 percent cobbles; slightly acid.

The content of gravel ranges from 5 to 40 percent in the A, E, Bhs, and Bs1 horizons and from 35 to 50 percent in the Bs2 and C horizons. The content of cobbles ranges from 0 to 20 percent throughout the profile. The content of rock fragments averages more than 35 percent in the control section.

The A horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It is dominantly cobbly loamy sand, but the range includes gravelly sandy loam and gravelly loamy sand.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 1 or 2. It is the cobbly or gravelly analogs of loamy sand or sandy loam.

The Bhs horizon has hue of 5YR and value and chroma of 2 or 3. It is the gravelly, cobbly, or very cobbly analogs of loamy sand, coarse sand, or sand.

The Bs1 horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. It is the gravelly, cobbly, or very cobbly analogs of loamy sand, coarse sand, or sand.

The Bs2 horizon has hue of 5YR or 7.5YR, value of 4, and chroma of 4 to 6. It is the very cobbly or very gravelly analogs of sand or coarse sand.

The C horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is very gravelly sand or very gravelly coarse sand.

Witbeck Series

The Witbeck series consists of very deep, poorly drained soils in depressions and drainageways on bedrock-controlled moraines and disintegration moraines. These soils formed in loamy till. Permeability is moderate. Slopes range from 0 to 2 percent.

Typical pedon of Witbeck very stony muck, in an area of Witbeck-Cathro complex, very bouldery; 690 feet south and 1,627 feet east of the northwest corner of sec. 9, T. 49 N., R. 29 W.; west of Wildcat Canyon, near the South Branch of the Dead River; USGS Bulldog Lake topographic quadrangle; lat. 46 degrees 39 minutes 48 seconds N. and long. 87 degrees 56 minutes 34 seconds W.

Oa—0 to 8 inches; black (N 2.5/0) very stony muck; weak fine granular structure; very friable; many very fine to coarse roots; about 15 percent stones, 10 percent cobbles, and 10 percent gravel; strongly acid; abrupt smooth boundary.

Eg1—8 to 12 inches; gray (5Y 5/1) very stony fine sandy loam, gray (5Y 6/1) dry; moderate medium subangular blocky structure; friable; common very fine to coarse roots; about 15 percent stones, 10 percent cobbles, and 12 percent gravel; strongly acid; clear smooth boundary.

Eg2—12 to 15 inches; greenish gray (5GY 5/1) very stony very fine sandy loam, light gray (10YR 7/2) dry; moderate medium platy structure; friable; few fine and medium roots; common medium faint dark greenish gray (5GY 4/1) iron depletions and few fine prominent brown (10YR 4/3) masses of iron accumulation; about 15 percent stones, 12 percent gravel, and 10 percent cobbles; strongly acid; clear wavy boundary.

Bg—15 to 22 inches; dark olive gray (5Y 3/2) very stony fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few medium distinct dark greenish gray (5GY 4/1) and few medium prominent greenish gray (5BG 5/1) iron depletions; few fine prominent yellowish brown (10YR 5/6) masses of iron accumulation; about 15 percent stones, 10 percent gravel, and 12 percent cobbles; strongly acid; clear wavy boundary.

BCg—22 to 24 inches; olive gray (5Y 4/2) gravelly fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; common medium distinct dark greenish gray (5GY 4/1) and common medium prominent greenish gray (5BG 5/1) iron depletions; few fine prominent brown (10YR 4/3) masses of iron accumulation; about 18 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid; clear smooth boundary.

Cg—24 to 80 inches; dark gray (5Y 4/1) gravelly sandy loam; massive; friable; few fine distinct olive (5Y 4/3) masses of iron accumulation; about 18 percent gravel, 5 percent cobbles, and 5 percent stones; moderately acid.

The content of gravel ranges from 0 to 10 percent in the O, Eg, and Bg horizons and from 15 to 25 percent in the BCg and Cg horizons. The content of cobbles ranges from 5 to 15 percent in the O, Eg, and Bg horizons and from 0 to 10 percent in the BCg and Cg horizons. The content of stones and boulders ranges from 10 to 15 percent in the O, Eg, and Bg horizons and from 0 to 5 percent in the BCg and Cg horizons. The content of rock fragments averages less than 35 percent in the control section.

The Oa horizon has hue of 5YR to 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2.

The Eg horizon has hue of 10YR, 2.5Y, 5Y, or 5GY, value of 4 to 6, and chroma of 1 or 2. It is dominantly very stony fine sandy loam, but the range includes very stony very fine sandy loam and very stony sandy loam. Some pedons have an A horizon.

The Bg horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 or 2. It is very stony fine sandy loam, stony very fine sandy loam, or stony sandy loam.

The BCg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. It is gravelly fine sandy loam or gravelly sandy loam.

The Cg horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 or 2. It is gravelly sandy loam or gravelly loamy sand.

Yalmer Series

The Yalmer series consists of very deep, moderately well drained soils on ground moraines, dissected bedrock benches, and till-floored lake plains. These soils are moderately deep to a fragipan. They formed in a sandy mantle over loamy till. Permeability is rapid in the upper part of the profile and very slow in the fragipan. Slopes range from 1 to 18 percent.

Typical pedon of Yalmer fine sand, 6 to 18 percent slopes; 1,300 feet south and 700 feet west of the northeast corner of sec. 4, T. 48 N., R. 27 W.; in the Dead River Basin area; USGS Negaunee SW topographic quadrangle; lat. 46 degrees 35 minutes 20 seconds N. and long. 87 degrees 41 minutes 45 seconds W.

Oe—0 to 1 inch; black (10YR 2/1), partially decomposed forest litter; moderately acid; abrupt smooth boundary.

E—1 to 10 inches; reddish gray (5YR 5/2) fine sand, pinkish gray (5YR 7/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 1 percent gravel; very strongly acid; abrupt smooth boundary.

Bhs—10 to 16 inches; dark reddish brown (5YR 3/3) fine sand; moderate medium subangular blocky structure; very friable; many very fine to coarse roots; about 1 percent gravel; strongly acid; gradual wavy boundary.

Bs—16 to 30 inches; reddish brown (5YR 4/4) fine sand; weak fine subangular blocky structure; very friable; few fine and very fine roots; about 1 percent gravel; very strongly acid; abrupt smooth boundary.

2(E/B)x—30 to 36 inches; about 70 percent dark reddish gray (5YR 4/2) loamy fine sand, white (5YR 8/1) dry (E); surrounding isolated remnants of reddish brown (5YR 4/3) fine sandy loam (Bt); weak thick platy structure; very firm; few very fine and fine roots; roots are in cracks 10 to 20 inches apart; common fine vesicular pores; few fine distinct yellowish red (5YR 5/6) masses of iron accumulation; about 7 percent gravel and 4 percent cobbles; very strongly acid; gradual wavy boundary.

2(B/E)x—36 to 80 inches; reddish brown (5YR 4/3) fine sandy loam (Bt); common distinct dark reddish brown (5YR 3/2) clay films on faces of peds; occupies about 60 percent of the horizon; surrounded by dark reddish gray (5YR 4/2) loamy fine sand, white (5YR 8/1) dry (E); weak thick platy structure; very firm; common fine vesicular pores; few fine distinct yellowish red (5YR 5/6) masses of iron accumulation; about 7 percent gravel and 4 percent cobbles; very strongly acid.

Depth to the fragipan ranges from 20 to 40 inches. The content of gravel ranges from 0 to 15 percent throughout the profile, and the content of cobbles ranges from 0 to 4 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3. It is dominantly fine sand, but the range includes sand and loamy sand. Some pedons have an A horizon.

The Bhs horizon has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3. It is fine sand, sand, or loamy sand.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. It is sand, fine sand, or loamy sand. Some pedons have 20 to 40 inches of moderately cemented ortstein.

The E part of the 2(E/B)x and 2(B/E)x horizons has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 or 3. It is loamy fine sand, sandy loam, or fine sandy loam. The Bt part of the 2(E/B)x and 2(B/E)x horizons has hue of 2.5YR or 5YR and value and chroma of 3 or 4. It is sandy loam or fine sandy loam. Some pedons have a C horizon.

Yellowdog Series

The Yellowdog series consists of excessively drained, very rapidly permeable soils that are moderately deep to bedrock. These soils are on sandstone benches. They formed in sandy and channery beach deposits overlying sandstone bedrock. Slopes range from 0 to 6 percent.

Typical pedon of Yellowdog very channery sand, 0 to 6 percent slopes, stony; 1,740 feet south and 2,040 feet west of the northeast corner of sec. 20, T. 51 N., R. 26 W.; USGS Big Bay topographic quadrangle; lat. 46 degrees 48 minutes 13 seconds N. and long. 87 degrees 37 minutes 50 seconds W.

Oa—0 to 2 inches; black (10YR 2/1), well decomposed leaf litter; moderate very fine granular structure; very friable; many very fine to coarse roots; very strongly acid; abrupt smooth boundary.

Bw1—2 to 22 inches; reddish brown (5YR 4/4) very channery sand; weak very fine subangular blocky structure; very friable; many very fine to coarse roots; about 55 percent sandstone channers; very strongly acid; gradual wavy boundary.

Bw2—22 to 32 inches; reddish brown (5YR 5/4) very channery sand; weak very fine subangular blocky structure; very friable; common very fine to medium roots; about 55 percent sandstone channers; moderately acid; abrupt wavy boundary.

2R—32 inches; dusky red (2.5YR 3/2) sandstone bedrock; hard bedrock with fractures 2 to 10 millimeters thick and 1 to 5 feet apart; common very fine roots in crevices of bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of channers ranges from 35 to 75 percent.

Some pedons have an A horizon. This horizon has hue of 10YR, value of 2 or 3, and chroma of 1. It is very channery sand or very channery loamy sand.

The Bw horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4. It is very channery sand or extremely channery sand.

The underlying bedrock is sandstone.

Zeba Series

The Zeba series consists of somewhat poorly drained soils that are moderately deep to bedrock. These soils are on sandstone benches. They formed in loamy till overlying sandstone bedrock. Permeability is moderate. Slopes range from 0 to 3 percent.

Typical pedon of Zeba cobbly fine sandy loam, 0 to 3 percent slopes, very stony; 152 feet west and 253 feet north of the southeast corner of sec. 16, T. 47 N., R. 23 W.; USGS Skandia topographic quadrangle; lat. 46 degrees 27 minutes 54.66 seconds N. and long. 87 degrees 10 minutes 45.14 seconds W.

Oa—0 to 4 inches; black (N 2.5/0), well decomposed forest litter; moderate fine granular structure; very friable; many very fine to coarse roots; extremely acid; abrupt smooth boundary.

E—4 to 10 inches; reddish gray (5YR 5/2) cobbly fine sandy loam, pinkish gray (5YR 6/2) dry; moderate fine subangular blocky structure; friable; many very fine to coarse roots; about 20 percent cobbles and 10 percent gravel; very strongly acid; clear broken boundary.

Bs—10 to 14 inches; reddish brown (5YR 4/3) cobbly fine sandy loam; weak fine subangular blocky structure; friable; many very fine to coarse roots; few fine distinct yellowish red (5YR 5/6) masses of iron accumulation; about 15 percent cobbles and 5 percent gravel; very strongly acid; clear broken boundary.

E/B—14 to 19 inches; about 70 percent brown (7.5YR 5/3) loamy sand, light brown (7.5YR 6/3) dry (E); surrounding reddish brown (2.5YR 4/4) sandy loam (Bt); weak thin platy structure; firm; common fine vesicular pores; common black (N 2.5/0) organic stains between plates; common medium distinct yellowish red (5YR 5/8) masses of iron accumulation; about 8 percent gravel and 2 percent cobbles; very strongly acid; gradual wavy boundary.

B/E—19 to 31 inches; reddish brown (2.5YR 4/4) sandy loam (Bt); few distinct dark reddish brown (2.5YR 3/4) clay films on faces of peds; occupies 60 percent of the horizon; surrounding brown (7.5YR 5/3) loamy sand, light brown (7.5YR 6/3) dry (E); weak medium platy structure; firm; common fine vesicular pores; common black (N 2.5/0) organic stains between plates; few distinct strong brown (7.5YR 5/8) sand lenses; common medium prominent yellowish red (5YR 5/8) masses of iron accumulation; about 8 percent gravel and 2 percent cobbles; very strongly acid; gradual smooth boundary.

2R—31 inches; very dusky red (2.5YR 2.5/2) and pinkish gray (5YR 6/2) sandstone bedrock.

Depth to bedrock ranges from 20 to 40 inches. The content of cobbles ranges from 0 to 20 percent in the E and Bs horizons and from 0 to 10 percent in the E/B and B/E horizons. The content of gravel ranges from 0 to 15 percent throughout the profile.

The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is dominantly cobbly fine sandy loam, but the range includes loamy sand, sandy loam, cobbly loamy sand, and cobbly sandy loam. Some pedons have an A horizon.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4. It is sandy loam, fine sandy loam, cobbly sandy loam, or cobbly fine sandy loam.

The E part of the E/B and B/E horizons has hue of 5YR or 7.5YR, value of 5, and chroma of 2 or 3. It is loamy sand or sandy loam. The Bt part of the E/B and B/E horizons has hue of 2.5YR or 5YR and value and chroma of 4 to 6. It is sandy loam or fine sandy loam. Some pedons have a C horizon.

The underlying bedrock is sandstone.

Formation of the Soils

This section relates the major factors of soil formation to the soils in the survey area. It also describes the processes of soil formation.

Factors of Soil Formation

Soil forms through the interaction of five major factors: the physical, chemical, and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the processes of soil formation have acted on the parent material (Jenny, 1941).

Climate and plant and animal life are the active forces of soil formation. They slowly change the parent material into a natural body of soil that has genetically related layers, called horizons. The effects of climate and plant and animal life are conditioned by relief. The nature of the parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the differentiation of soil horizons.

The factors of soil formation are so closely interrelated in their effects on the soils that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the others.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It affects the limits of the chemical and mineralogical composition of the soil. In this survey area, nearly all of the parent materials were deposited by glaciers or glacial meltwater. The subsequent actions of water and wind reworked and redeposited the materials. Although most of the parent materials are of common glacial origin, their properties vary greatly, sometimes within small areas, depending on how the materials were deposited.

The dominant parent materials in the survey area were deposited as till, drift, glacial outwash, lacustrine material, eolian material, alluvium, and organic material. The soil mantle ranges from several inches to more than 450 feet in thickness. Bedrock commonly is exposed or at a shallow depth throughout the survey area.

Till was deposited directly by glaciers with minimal water action. It is a mixture of particles of different sizes. The small pebbles in till have sharp corners, indicating that they have not been worn by water. Munising, Schweitzer, and Emmet soils are examples of soils that formed in till on till plains and moraines.

Drift is pulverized rock material transported and deposited by glacial ice. It also is the sorted and unsorted material that was deposited by streams flowing from the glaciers. Keweenaw, Sundog, and Ishpeming soils are examples of soils that formed in drift.

Outwash material was deposited by running water from melting glaciers. The size of the particles depends on the speed of the stream that carried the material. The water deposited the coarser particles as it slowed down. Slowly moving water carried the finer particles, such as very fine sand, silt, and clay. Outwash deposits generally occur

as layers of particles of similar size, such as sand, gravel, or other coarse particles. Rubicon, Grayling, and Waiska soils are examples of soils that formed in deposits of outwash material.

Lacustrine material was deposited from still, or ponded, glacial meltwater. It consists of fine soil particles, such as very fine sand, silt, and clay, that settled out in the still water. Soils that formed in lacustrine deposits are typically medium to fine textured. Fence and Alcona soils are examples of soils that formed in lacustrine material.

Eolian material has been transported and deposited by the wind. It consists primarily of fine sand, very fine sand, and silt. It typically occurs as a surface mantle overlying glacial deposits. Goodman and Wabeno soils are examples of soils that formed in this material.

Alluvium is material recently deposited by floodwater from streams. This material varies in texture, depending on the speed of the water from which it was deposited. Evart and Pelkie soils are examples of soils that formed in alluvium.

Organic material occurs as deposits of plant residue. After the glaciers withdrew from the area, water remained standing in depressions on outwash plains, flood plains, moraines, and till plains. Grasses and sedges grew around the edges of these lakes. When these plants died, their residue did not decompose because the areas were wet. Later, water-tolerant trees grew in the areas. After these trees died, their residue became part of the organic accumulation. Eventually, the lakes were filled with organic material and developed into areas of muck. Carbondale and Greenwood soils are examples of soils that formed in organic material.

Plant and Animal Life

Plants, animals, insects, bacteria, and fungi are important in the formation of soils. Additions of organic matter and nitrogen in the soil, gains or losses in plant nutrients, and alterations in soil structure and porosity are among the changes caused by living organisms. In this survey area, vegetation, dominantly hardwood and coniferous trees, has affected soil formation more than the other living organisms.

Climate

Climate determines the kind of plant and animal life on and in the soil and the amount of water available for the weathering of minerals and the translocation of soil material. Through its influence on soil temperature, climate also determines the rate of chemical reaction in the soil.

The climate in Marquette County is cool and humid. Presumably, it is similar to that under which the soils formed. The soils in Marquette County differ from soils that formed under a dry, warm climate and from those that formed under a moist, hot climate. The climate generally is uniform in all areas, except for those within a few miles of Lake Superior. Only minor differences among the soils in the county are the result of differences in climate.

Relief

Relief affects soil formation through its effect on drainage, runoff, erosion, plant cover, and soil temperature. The topography in Marquette County varies greatly. It includes both depressions and steep hills. In the hilly areas, local relief is as much as 400 to 700 feet and the slope is as much as 70 percent. In some areas near Gwinn, the slope is less than 2 percent. Many small, nearly level areas are interspersed throughout the undulating and hilly areas. The nearly level areas receive runoff from the more sloping areas. The water table is at or near the surface in depressional areas.

Through its effect on soil aeration, drainage determines the color of the soil. Water and air move freely through well drained soils and slowly through very poorly drained soils. In well aerated soils, the iron and aluminum compounds that give most soils their color are brightly colored and oxidized. Poorly aerated soils are dull gray and mottled. The sequence of excessively drained Rubicon, moderately well drained Croswell, somewhat poorly drained Au Gres, and poorly drained Deford soils is an example of a catena. All of these soils formed in sandy material, but they have different colors because of variations in relief and drainage.

Time

Generally, a long time is needed for the development of distinct horizons. The degree of profile development commonly reflects the length of time that the parent material has been in place. Some soils form rapidly; others form slowly.

The soils in Marquette County range from young to mature. Most of the soils that formed in glacial deposits have been exposed to the soil-forming factors long enough for the development of distinct horizons. Kalkaska soils are examples. The soils that formed in recent alluvial material have not been in place long enough for distinct horizons to develop. Pelkie soils are examples.

Processes of Soil Formation

The processes responsible for the development of the soil horizons in the unconsolidated parent material are referred to as soil genesis. Several processes were involved in the development of horizons in the soils of Marquette County. These are the accumulation of organic matter, the leaching of lime (calcium carbonate) and other bases, the reduction and transfer of iron, and the formation and translocation of silicate clay minerals. More than one of these processes have helped to differentiate horizons in most of the soils.

As organic material accumulates at the surface, an A horizon forms. The A and E horizons are mixed into a plow layer, or Ap horizon, if the soil is plowed. The surface layer of the soils in Marquette County ranges from high to low in organic matter content. The content is high, for example, in Ensley soils and low in Rubicon soils.

Carbonates and other bases have been leached from most of the soils. The leaching of bases generally precedes the translocation of silicate clay minerals. Many of the soils are moderately leached or strongly leached. Sagola soils, for example, are leached of carbonates to a depth of about 50 inches. Northland soils, however, have carbonates within about 18 inches of the surface.

Gleying, or the reduction and transfer of iron, is evident in somewhat poorly drained, poorly drained, and very poorly drained soils. Witbeck soils are examples of soils in which this process has occurred. A grayish subsoil indicates the reduction and loss of iron. Some horizons have mottles, indicating the segregation of iron. This process has taken place in Net soils.

The translocation of clay minerals has contributed to horizon development in some soils. An eluviated, or leached, E horizon typically is lower in content of clay and lighter in color than the illuviated B horizon. The B horizon typically has an accumulation of clay, or clay films, in pores and on the faces of peds. These soils were probably leached of carbonates and soluble salts to a considerable extent before the translocation of silicate clay minerals. Nadeau soils are examples of soils in which translocated silicate clay minerals in the form of clay films have accumulated in the B horizon.

In some of the soils in Marquette County, iron, aluminum, and humus have been transferred from the surface layer to the B horizon. Kalkaska and Yalmer soils are examples.

The soils of Marquette County formed in specific landform and climatic regimes that along with the soil parent material were the result of the bedrock and glacial geological history of the site. These soils were capable of supporting a unique vegetational succession, which in turn influenced further formation and development of the soil. A history of catastrophic events, such as fire, affected some species on certain soils and landforms that subsequently altered the characteristics of the soil. Human influences have had a profound impact on vegetation and landscape. Humans have the power to enhance and maintain the soil resources or to degrade and destroy them. Therefore, an understanding of the relationship between vegetation, physiography, soils, and human activities is important.

In Marquette County, human activities, such as agriculture, logging, urban development, road building, and mining, have influenced soil formation. When the land is cleared for agriculture or reforestation, the soil microclimate is changed and new soil flora and fauna develop, leading to the establishment of new species of vegetation that can in turn alter further soil development. The construction of roads and buildings obscures the natural soils in some areas. The collapse of underground mines has resulted in areas of caving ground and in some cases has created lakes. Mine pits, rock piles, and tailings basins are new parent materials that could, after reclamation and the establishment of vegetation, become new soils in the future.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha,alpha-dipyridyl. A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A saucer-, cup-, or trough-shaped depression formed by wind erosion on a preexisting dune or other sand deposit, especially in an area of shifting sand or loose soil or where protective vegetation is disturbed or destroyed; the adjoining accumulation of sand derived from the depression, where recognizable, is commonly included. Blowouts are commonly small.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. See Redoximorphic features.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diatomaceous earth. A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Drift. A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact till that has a core of bedrock or drift. It commonly has a blunt nose facing the direction from which the ice approached and a gentler slope tapering in the other direction. The longer axis is parallel to the general direction of glacier flow. Drumlins are products of streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.

Dune. A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill. See Mine spoil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are bedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. See Redoximorphic features.

Kame. A low mound, knob, hummock, or short irregular ridge composed of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier; by a supraglacial stream in a low place or hole on the surface of the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Kame terrace. A terrace-like ridge consisting of stratified sand and gravel (a) deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine, and (b) left standing after the disappearance of the ice. It is commonly pitted with “kettles” and has an irregular ice-contact slope.

Karst (topography). A kind of topography that formed in limestone, gypsum, or other soluble rocks by dissolution and that is characterized by closed depressions, sinkholes, caves, and underground drainage.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Landform. Any physical, recognizable form or feature on the earth’s surface, having a characteristic shape and range in composition and produced by natural causes; it includes a wide range in size. Landforms provide an empirical description of similar portions of the earth’s surface.

Landscape. A collection of related, natural landforms; typically, the land surface that the eye can comprehend in a single view.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to

determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Marsh. Periodically wet or continually flooded areas; the surface is not deeply submerged. Covered dominantly with sedges, cattails, rushes, or other hydrophytic plants.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. See Redoximorphic features.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine. In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, lateral, recessional, and terminal.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mountain. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat. Unconsolidated soil material consisting primarily of organic matter that is in an intermediate stage of decomposition such that a significant part of the original material can be recognized and a significant part cannot be recognized.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash. Stratified and sorted sediments (chiefly sand and gravel) removed or “washed out” from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain. An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted

as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitted outwash. Outwash with pits or kettles, produced by the partial or complete burial of glacial ice by outwash and the subsequent thaw of the ice and collapse of the surficial materials.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proglacial lake. A type of glacial lake that formed just beyond the margin of an advancing or retreating glacier; generally in direct contact with the ice.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Ravine. A small stream channel that is narrow, steep-sided, and commonly V-shaped in cross section and is larger than a gully.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is

neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturated hydraulic conductivity (Ksat). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Nearly level and gently sloping	1 to 6 percent
Nearly level to moderately sloping	1 to 12 percent
Moderately sloping and strongly sloping	6 to 18 percent
Moderately sloping to steep	8 to 35 percent
Steep	18 to 35 percent
Moderately steep to very steep	15 to 70 percent

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Nearly level and gently undulating	0 to 4 percent
Nearly level and undulating	0 to 6 percent
Gently undulating	1 to 6 percent
Nearly level to gently sloping	0 to 12 percent
Gently rolling and rolling	6 to 25 percent
Very hilly	18 to 45 percent
Hilly to very steep	15 to 70 percent
Very hilly	25 to 70 percent
Very steep	35 to 70 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.
Terminal moraine. An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.
Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."
Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.
Till. Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.
Till plain. An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.
Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.
Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.
Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.
Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.
Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.
Tuff. A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.
Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.
Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.
Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.
Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.
Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily

increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Van Riper State Park and Marquette, Michigan)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
VAN RIPER STATE PARK:											
January----	22.0	0.1	11.1	43	-32	0	1.84	1.02	2.56	5	29.5
February---	27.6	2.0	14.8	53	-34	1	1.32	.69	1.87	3	18.0
March------	37.7	11.0	24.3	63	-27	9	2.32	1.30	3.23	5	21.8
April------	51.4	23.4	37.4	81	-8	90	2.42	1.39	3.34	5	8.7
May--------	66.2	34.9	50.5	87	15	337	3.04	1.59	4.30	6	1.1
June-------	74.2	44.3	59.3	90	24	580	3.27	2.06	4.37	7	.0
July-------	78.4	49.7	64.0	93	31	746	3.79	1.99	5.36	7	.0
August-----	76.0	48.4	62.2	90	29	681	3.82	2.37	5.14	7	.0
September--	66.7	41.1	53.9	87	21	424	3.77	2.43	4.98	8	.1
October----	54.8	31.8	43.3	78	13	161	3.32	2.14	4.40	7	5.0
November---	37.7	20.3	29.0	62	-6	15	2.50	1.48	3.42	6	18.9
December---	25.9	7.4	16.6	47	-26	1	1.83	1.06	2.53	5	26.7
Yearly:											
Average---	51.6	26.2	38.9	---	---	---	---	---	---	---	---
Extreme---	98	-44	---	94	-37	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,047	33.24	26.79	37.67	71	129.7
MARQUETTE:											
January----	25.3	11.2	18.2	45	-14	0	2.03	1.21	2.77	6	30.7
February---	29.0	13.6	21.3	53	-12	2	1.33	.71	1.88	4	19.3
March------	36.7	21.5	29.1	65	-3	16	2.21	1.18	3.11	5	20.4
April------	47.8	31.7	39.8	81	14	101	2.38	1.39	3.26	5	7.8
May--------	60.8	41.4	51.1	89	27	345	2.65	1.20	3.90	5	1.1
June-------	69.4	50.2	59.8	92	35	593	2.74	1.61	3.74	5	.0
July-------	75.6	56.9	66.3	96	43	815	2.64	1.34	3.77	5	.0
August-----	74.6	57.2	65.9	94	43	798	3.01	1.65	4.22	6	.0
September--	66.2	49.4	57.8	89	33	531	3.42	2.02	4.67	7	.2
October----	54.8	39.4	47.1	79	25	235	3.03	1.90	4.05	7	1.7
November---	40.3	28.4	34.4	65	8	37	2.61	1.49	3.60	6	12.2
December---	29.4	17.1	23.2	50	-7	2	1.97	1.19	2.67	6	26.2
Yearly:											
Average---	50.8	24.8	42.8	---	---	---	---	---	---	---	---
Extreme---	104	-24	---	98	-16	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,474	30.02	25.48	33.70	67	119.7

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Van Riper State Park and Marquette, Michigan)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
VAN RIPER STATE PARK:			
Last freezing temperature in spring:			
1 year in 10 later than--	June 9	June 26	July 20
2 years in 10 later than--	June 4	June 19	July 12
5 years in 10 later than--	May 24	June 7	June 25
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 14	Aug. 27	Aug. 8
2 years in 10 earlier than--	Sept. 19	Sept. 1	Aug. 15
5 years in 10 earlier than--	Oct. 1	Sept. 12	Aug. 27
MARQUETTE:			
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 28	May 13	May 25
2 years in 10 later than--	Apr. 22	May 8	May 20
5 years in 10 later than--	Apr. 12	Apr. 28	May 10
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 27	Oct. 10	Sept. 26
2 years in 10 earlier than--	Oct. 31	Oct. 16	Oct. 2
5 years in 10 earlier than--	Nov. 8	Oct. 29	Oct. 12

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Van Riper State Park and Marquette, Michigan)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
VAN RIPER STATE PARK:			
9 years in 10	106	67	30
8 years in 10	114	77	41
5 years in 10	130	95	63
2 years in 10	146	114	85
1 year in 10	154	123	97
MARQUETTE:			
9 years in 10	184	157	133
8 years in 10	193	166	140
5 years in 10	208	183	154
2 years in 10	224	200	168
1 year in 10	233	209	176

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
10B	Grayling sand, 0 to 6 percent slopes	22,290	1.9
10D	Grayling sand, 6 to 18 percent slopes	3,116	0.3
10E	Grayling sand, 18 to 35 percent slopes	629	*
11C	Deer Park sand, 1 to 10 percent slopes	4,813	0.4
11D	Deer Park sand, 6 to 18 percent slopes	544	*
12B	Rubicon sand, 0 to 6 percent slopes	29,722	2.5
12D	Rubicon sand, 6 to 18 percent slopes	9,136	0.8
12E	Rubicon sand, 18 to 35 percent slopes	2,497	0.2
12F	Rubicon sand, 35 to 70 percent slopes	1,210	0.1
13B	Kalkaska sand, 0 to 6 percent slopes	9,508	0.8
13D	Kalkaska sand, 6 to 18 percent slopes	3,834	0.3
13E	Kalkaska sand, 18 to 35 percent slopes	582	*
13F	Kalkaska sand, 35 to 70 percent slopes	836	*
14B	Rousseau fine sand, 0 to 6 percent slopes	972	*
14D	Rousseau fine sand, 6 to 18 percent slopes	884	*
15A	Croswell sand, 0 to 3 percent slopes	13,488	1.1
16A	Paquin sand, 0 to 3 percent slopes	3,174	0.3
17A	Au Gres sand, 0 to 3 percent slopes	8,096	0.7
18	Kinross mucky peat	2,272	0.2
19	Deford muck	2,464	0.2
20B	Rousseau-Ocqueoc fine sands, 0 to 6 percent slopes	3,725	0.3
20D	Rousseau-Ocqueoc fine sands, 6 to 18 percent slopes	2,679	0.2
20E	Rousseau-Ocqueoc fine sands, 18 to 35 percent slopes	519	*
22B	Alcona loamy very fine sand, 1 to 6 percent slopes	380	*
24B	Munising fine sandy loam, 1 to 6 percent slopes	5,178	0.4
24D	Munising fine sandy loam, 6 to 18 percent slopes	1,633	0.1
25B	Munising-Yalmer complex, 1 to 6 percent slopes	2,108	0.2
25D	Munising-Yalmer complex, 6 to 18 percent slopes	915	*
26A	Skanee cobbly fine sandy loam, 0 to 3 percent slopes, stony	3,139	0.3
27	Gay muck, stony	3,472	0.3
28B	Keweenaw loamy sand, 1 to 6 percent slopes	3,258	0.3
28D	Keweenaw loamy sand, 6 to 18 percent slopes	3,544	0.3
28E	Keweenaw loamy sand, 18 to 35 percent slopes	656	*
29B	Yalmer fine sand, 1 to 6 percent slopes	1,070	*
29D	Yalmer fine sand, 6 to 18 percent slopes	555	*
31D	Trenary silt loam, 6 to 18 percent slopes	1,148	*
32A	Charlevoix silt loam, 0 to 3 percent slopes	2,805	0.2
33	Ensley muck	2,298	0.2
34B	Onaway fine sandy loam, 1 to 6 percent slopes	6,435	0.5
34D	Onaway fine sandy loam, 6 to 18 percent slopes	4,110	0.3
34E	Onaway fine sandy loam, 18 to 35 percent slopes	859	*
35B	Champion cobbly fine sandy loam, 1 to 6 percent slopes, very stony	1,428	0.1
35D	Champion cobbly fine sandy loam, 6 to 18 percent slopes, very stony	584	*
36A	Net cobbly very fine sandy loam, 0 to 3 percent slopes, very stony	554	*
37	Witbeck very stony muck, extremely bouldery	3,302	0.3
38B	Pence fine sandy loam, 0 to 6 percent slopes	20,957	1.7
38D	Pence fine sandy loam, 6 to 18 percent slopes	3,590	0.3
38E	Pence fine sandy loam, 18 to 35 percent slopes	1,493	0.1
39B	Amasa very fine sandy loam, 1 to 6 percent slopes	979	*
39D	Amasa very fine sandy loam, 6 to 18 percent slopes	508	*
39E	Amasa very fine sandy loam, 18 to 35 percent slopes	412	*
40B	Waiska cobbly loamy sand, 0 to 6 percent slopes	2,846	0.2
40D	Waiska cobbly loamy sand, 6 to 18 percent slopes	357	*
41A	Channing fine sandy loam, 0 to 3 percent slopes	2,081	0.2
42	Minocqua muck	2,473	0.2
43B	Karlin sandy loam, 1 to 6 percent slopes	3,328	0.3
43D	Karlin sandy loam, 6 to 18 percent slopes	570	*
44B	Carlshend fine sandy loam, 1 to 6 percent slopes, stony	588	*
45A	Zeba cobbly fine sandy loam, 0 to 3 percent slopes, very stony	492	*
46	Jacobsville muck, very stony	669	*
48	Burt muck	832	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
50A	Sundell loam, 0 to 3 percent slopes	2,465	0.2
51	Nahma muck	3,856	0.3
52B	Summerville fine sandy loam, 1 to 6 percent slopes	510	*
55F	Michigamme-Rock outcrop complex, 25 to 70 percent slopes, very bouldery	40,480	3.4
56D	Peshekee-Rock outcrop complex, 6 to 18 percent slopes, very bouldery	1,456	0.1
56E	Peshekee-Rock outcrop complex, 18 to 35 percent slopes, very bouldery	3,136	0.3
56F	Peshekee-Rock outcrop complex, 35 to 70 percent slopes, very bouldery	12,441	1.0
57	Carbondale and Tawas soils	131,204	10.9
58	Greenwood and Dawson soils	22,875	1.9
59	Chippeny and Nahma mucks	1,722	0.1
60	Histosols and Aquents, ponded	23,413	2.0
61	Pits, borrow	3,069	0.3
62B	Udorthents and Udipsamments, nearly level and gently sloping	2,453	0.2
64	Pits and Dumps, mine	8,901	0.7
65B	Udorthents-Urban land complex, nearly level and gently sloping	1,371	0.1
66B	Udipsamments-Urban land complex, nearly level and gently sloping	7,304	0.6
67B	Urban land-Rubicon complex, 0 to 6 percent slopes	728	*
68	Pits, quarries	124	*
69B	Escanaba loamy fine sand, 1 to 6 percent slopes	2,196	0.2
69D	Escanaba loamy fine sand, 6 to 18 percent slopes	630	*
70B	Nadeau fine sandy loam, 1 to 6 percent slopes	1,424	0.1
70D	Nadeau fine sandy loam, 6 to 18 percent slopes	413	*
71B	Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes	12,910	1.1
72B	Emmet fine sandy loam, 1 to 6 percent slopes	14,092	1.2
72D	Emmet fine sandy loam, 6 to 18 percent slopes	4,179	0.3
72E	Emmet fine sandy loam, 18 to 35 percent slopes	651	*
73B	Gogebic cobbly silt loam, 1 to 6 percent slopes, very stony	2,963	0.2
73D	Gogebic cobbly silt loam, 6 to 18 percent slopes, very stony	833	*
74D	Schweitzer-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very stony	3,270	0.3
74F	Schweitzer-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very stony	4,306	0.4
76C	Garlic-Alcona-Voelker complex, 1 to 12 percent slopes, dissected	6,472	0.5
76E	Garlic-Alcona-Voelker complex, 8 to 35 percent slopes, dissected	8,944	0.7
76F	Garlic-Alcona-Voelker complex, 15 to 70 percent slopes, dissected	12,132	1.0
77D	Garlic-Alcona-Voelker complex, 6 to 18 percent slopes	4,552	0.4
77E	Garlic-Alcona-Voelker complex, 18 to 35 percent slopes	386	*
78C	Keweenaw-Kalkaska complex, 1 to 12 percent slopes, dissected	3,292	0.3
78E	Keweenaw-Kalkaska complex, 8 to 35 percent slopes, dissected	6,471	0.5
78F	Keweenaw-Kalkaska complex, 15 to 60 percent slopes, dissected	8,934	0.7
79B	Keweenaw-Munising complex, 1 to 6 percent slopes	1,051	*
80B	Sayner-Rubicon complex, 1 to 6 percent slopes	17,475	1.5
80D	Sayner-Rubicon complex, 6 to 18 percent slopes	7,925	0.7
80E	Sayner-Rubicon complex, 18 to 35 percent slopes	2,152	0.2
81B	Pelissier gravelly sandy loam, 1 to 6 percent slopes	2,881	0.2
81D	Pelissier gravelly sandy loam, 6 to 18 percent slopes	1,182	*
81E	Pelissier gravelly sandy loam, 18 to 35 percent slopes	422	*
84D	Rubicon-Ishpeming-Rock outcrop complex, 6 to 25 percent slopes	5,201	0.4
84F	Rubicon-Ishpeming-Rock outcrop complex, 25 to 60 percent slopes	3,819	0.3
85A	Solona fine sandy loam, 0 to 3 percent slopes	1,609	0.1
86B	Mashek fine sandy loam, 0 to 4 percent slopes	3,386	0.3
87B	Cunard fine sandy loam, 1 to 6 percent slopes	1,221	0.1
88	Cathro-Ensley mucks	21,210	1.8
89B	Emmet-Solona fine sandy loams, 0 to 6 percent slopes	4,564	0.4
90B	Emmet-Escanaba complex, 1 to 6 percent slopes	7,013	0.6
90D	Emmet-Escanaba complex, 6 to 18 percent slopes	2,191	0.2
91B	Onaway-Nadeau fine sandy loams, 1 to 6 percent slopes	428	*
92A	Ensley-Solona complex, 0 to 3 percent slopes	4,642	0.4
93	Tawas-Deford mucks	13,479	1.1
94B	Keweenaw-Kalkaska complex, 1 to 6 percent slopes	2,016	0.2
94D	Keweenaw-Kalkaska complex, 6 to 18 percent slopes	4,661	0.4
94E	Keweenaw-Kalkaska complex, 18 to 35 percent slopes	691	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
95B	Liminga fine sand, 1 to 6 percent slopes	1,172	*
95D	Liminga fine sand, 6 to 18 percent slopes	686	*
100E	Sayner-Rubicon complex, 8 to 35 percent slopes, dissected	833	*
100F	Sayner-Rubicon complex, 15 to 60 percent slopes, dissected	869	*
103D	Rubicon-Ocqueoc-Rock outcrop complex, 6 to 25 percent slopes	2,028	0.2
104C	Fence very fine sandy loam, 1 to 12 percent slopes, dissected	1,755	0.1
105C	Munising fine sandy loam, 1 to 12 percent slopes, dissected	4,858	0.4
106B	Sagola-Rubicon complex, 1 to 6 percent slopes, bouldery	2,102	0.2
106D	Sagola-Rubicon complex, 6 to 18 percent slopes, bouldery	3,529	0.3
107B	Goodman-Sundog silt loams, 1 to 6 percent slopes, bouldery	1,898	0.2
107D	Goodman-Sundog silt loams, 6 to 18 percent slopes, bouldery	8,365	0.7
107F	Goodman-Sundog silt loams, 18 to 45 percent slopes, bouldery	7,506	0.6
108B	Goodman-Sundog-Wabeno silt loams, 1 to 6 percent slopes, bouldery	1,876	0.2
108D	Goodman-Sundog-Wabeno silt loams, 6 to 18 percent slopes, bouldery	3,953	0.3
109B	Rubicon-Keweenaw complex, 1 to 6 percent slopes, very bouldery	3,848	0.3
109D	Rubicon-Keweenaw complex, 6 to 18 percent slopes, very bouldery	16,849	1.4
109F	Rubicon-Keweenaw complex, 18 to 45 percent slopes, very bouldery	5,671	0.5
110B	Nadeau-Mancelona complex, 1 to 6 percent slopes	1,880	0.2
110D	Nadeau-Mancelona complex, 6 to 18 percent slopes	486	*
111B	Grayling sand, 0 to 4 percent slopes, rocky	944	*
112D	Keewaydin-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	29,755	2.5
112F	Keewaydin-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very bouldery	20,342	1.7
113B	Vanriper very cobbly silt loam, 1 to 6 percent slopes, rocky, very bouldery	548	*
113D	Vanriper very cobbly silt loam, 6 to 18 percent slopes, rocky, very bouldery	2,103	0.2
113F	Vanriper very cobbly silt loam, 18 to 45 percent slopes, rocky, very bouldery	500	*
114B	Vanriper very cobbly silt loam, 1 to 6 percent slopes, very bouldery	309	*
114D	Vanriper very cobbly silt loam, 6 to 18 percent slopes, very bouldery	981	*
114F	Vanriper very cobbly silt loam, 18 to 45 percent slopes, very bouldery	280	*
117B	Fence very fine sandy loam, 1 to 6 percent slopes	692	*
118A	Croswell-Deford complex, 0 to 3 percent slopes	9,341	0.8
119B	Yalmer-Kalkaska complex, 1 to 6 percent slopes	1,076	*
119D	Yalmer-Kalkaska complex, 6 to 18 percent slopes	671	*
121B	Onota gravelly sandy loam, 1 to 6 percent slopes	456	*
122	Pleine very cobbly muck, very stony	1,515	0.1
123A	Tula cobbly very fine sandy loam, 0 to 3 percent slopes, very stony	753	*
124B	Gogebic-Dishno cobbly silt loams, 1 to 6 percent slopes, rocky, very stony	404	*
124D	Gogebic-Dishno cobbly silt loams, 6 to 18 percent slopes, rocky, very stony	4,957	0.4
125D	Keweenaw-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	13,265	1.1
125F	Keweenaw-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very bouldery	11,074	0.9
126B	Sundog silt loam, 1 to 6 percent slopes	7,247	0.6
126D	Sundog silt loam, 6 to 18 percent slopes	3,988	0.3
126E	Sundog silt loam, 18 to 35 percent slopes	892	*
127B	Sundog silt loam, 1 to 6 percent slopes, bouldery	1,733	0.1
127D	Sundog silt loam, 6 to 18 percent slopes, bouldery	1,988	0.2
127F	Sundog silt loam, 18 to 45 percent slopes, bouldery	577	*
128B	Kalkaska-Waiska complex, 1 to 6 percent slopes	5,926	0.5
128D	Kalkaska-Waiska complex, 6 to 18 percent slopes	1,798	0.1
128E	Kalkaska-Waiska complex, 18 to 35 percent slopes	781	*
129C	Kalkaska-Munising complex, 1 to 12 percent slopes, dissected	849	*
130A	Chabeneau silt loam, 0 to 3 percent slopes	4,414	0.4
131	Witbeck-Cathro complex, very bouldery	7,919	0.7
132	Slickens	9,417	0.8

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
133B	Keewaydin-Dishno complex, 1 to 6 percent slopes, rocky, bouldery	2,525	0.2
133D	Keewaydin-Dishno complex, 6 to 18 percent slopes, rocky, bouldery	17,493	1.5
134B	Keewaydin cobbly fine sandy loam, 1 to 6 percent slopes, bouldery	3,340	0.3
134D	Keewaydin cobbly fine sandy loam, 6 to 18 percent slopes, bouldery	5,275	0.4
134F	Keewaydin cobbly fine sandy loam, 18 to 45 percent slopes, bouldery	498	*
135A	Witbeck-Net complex, 0 to 3 percent slopes, extremely bouldery	2,061	0.2
136A	Minocqua-Channing complex, 0 to 3 percent slopes	5,014	0.4
137D	Keewaydin-Sundog complex, 6 to 18 percent slopes, very bouldery	4,223	0.4
137F	Keewaydin-Sundog complex, 18 to 45 percent slopes, very bouldery	456	*
138D	Sundog-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	10,212	0.9
138F	Sundog-Rock outcrop complex, 25 to 70 percent slopes, very bouldery	3,635	0.3
139B	Sundog silt loam, 1 to 6 percent slopes, rocky, very bouldery	1,431	0.1
139D	Sundog silt loam, 6 to 18 percent slopes, rocky, very bouldery	4,012	0.3
140B	Champion-Dishno complex, 1 to 6 percent slopes, rocky, very stony	472	*
140D	Champion-Dishno complex, 6 to 18 percent slopes, rocky, very stony	2,463	0.2
141D	Pelissier-Rock outcrop complex, 6 to 25 percent slopes	1,082	*
142B	Pelissier gravelly sandy loam, 1 to 6 percent slopes, rocky	982	*
142D	Pelissier gravelly sandy loam, 6 to 18 percent slopes, rocky	1,165	*
144B	Farquar gravelly sandy loam, 0 to 4 percent slopes	2,110	0.2
145C	Munising-Yalmer complex, 1 to 12 percent slopes, dissected, very stony	5,945	0.5
146B	Munising-Skanee complex, 0 to 6 percent slopes, stony	7,956	0.7
147A	Skanee-Gay complex, 0 to 3 percent slopes, very stony	7,609	0.6
148B	Shoepac-Ensley complex, 0 to 6 percent slopes	10,054	0.8
149	Evart-Cathro complex	7,716	0.6
150	Shag muck	519	*
151A	Spear very fine sandy loam, 0 to 3 percent slopes	964	*
153D	Ishpeming-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	1,326	0.1
153F	Ishpeming-Rock outcrop complex, 25 to 70 percent slopes, very bouldery	1,988	0.2
154B	Rubicon-Sayner complex, 1 to 6 percent slopes, rocky	2,198	0.2
154D	Rubicon-Sayner complex, 6 to 18 percent slopes, rocky	2,619	0.2
155A	Zeba-Jacobsville complex, 0 to 3 percent slopes, very stony	6,257	0.5
156B	Duel loamy sand, 1 to 6 percent slopes, very stony	436	*
157B	Reade-Nahma complex, 0 to 6 percent slopes, stony	1,109	*
158C	Munising-Onota-Yalmer complex, 1 to 12 percent slopes, dissected, stony	2,452	0.2
159A	Jeske sand, 0 to 3 percent slopes	218	*
160B	Paquin-Finch sands, 0 to 5 percent slopes	3,930	0.3
161B	Yellowdog very channery sand, 0 to 6 percent slopes, stony	3,365	0.3
162B	Buckroe very channery loamy sand, 0 to 6 percent slopes, stony	620	*
165B	Chocolay-Waiska complex, 1 to 6 percent slopes, stony	970	*
166	Skandia mucky peat	219	*
167	Skandia-Jacobsville complex, stony	644	*
168B	Yellowdog-Burt complex, 0 to 6 percent slopes	1,183	*
170B	Chocolay very cobbly fine sandy loam, 1 to 6 percent slopes, very stony	290	*
171B	Paavola very gravelly loamy sand, 1 to 6 percent slopes, stony	618	*
172D	Buckroe-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	1,018	*
172F	Buckroe-Rock outcrop complex, 25 to 70 percent slopes, very bouldery	575	*
173B	Pence fine sandy loam, 1 to 6 percent slopes, rocky, bouldery	2,356	0.2
173D	Pence fine sandy loam, 6 to 18 percent slopes, rocky, bouldery	2,227	0.2
174D	Yalmer-Rubicon-Urban land complex, 4 to 18 percent slopes	815	*
175E	Kalkaska-Waiska complex, 8 to 35 percent slopes, dissected	570	*
175F	Kalkaska-Waiska complex, 15 to 70 percent slopes, dissected	1,161	*
176B	Greenwood-Croswell complex, 0 to 6 percent slopes	4,573	0.4
177E	Frohling fine sandy loam, 8 to 35 percent slopes, dissected	2,032	0.2
177F	Frohling fine sandy loam, 15 to 70 percent slopes, dissected	439	*
178D	Schweitzer-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very stony	4,384	0.4
178F	Schweitzer-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very stony	2,579	0.2
179E	Schweitzer-Michigamme complex, 18 to 35 percent slopes, rocky, very stony	553	*
180E	Kalkaska-Frohling complex, 8 to 35 percent slopes, dissected	2,072	0.2
180F	Kalkaska-Frohling complex, 15 to 70 percent slopes, dissected	1,682	0.1

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
181E	Frohling-Tokiahok complex, 8 to 35 percent slopes, dissected, very stony	5,234	0.4
181F	Frohling-Tokiahok complex, 15 to 70 percent slopes, dissected, very stony	2,682	0.2
184C	Dishno-Witbeck-Rock outcrop complex, 0 to 12 percent slopes, very bouldery	9,708	0.8
185B	Northland loamy fine sand, 0 to 4 percent slopes	603	*
187B	Reade silt loam, 0 to 4 percent slopes	1,273	0.1
190B	Emmet-Cunard fine sandy loams, 1 to 6 percent slopes, stony	2,340	0.2
191B	Nahma-Sundell complex, 0 to 4 percent slopes	1,457	0.1
193E	Frohling-Tokiahok complex, 18 to 35 percent slopes	313	*
194E	Sporley silt loam, 8 to 35 percent slopes, dissected	478	*
196E	Frohling-Onota-Tokiahok complex, 8 to 35 percent slopes, dissected, stony	1,316	0.1
197B	Shoepac-Trenary silt loams, 1 to 6 percent slopes	14,544	1.2
198B	Shoepac-Reade silt loams, 1 to 4 percent slopes	1,377	0.1
199	Udorthents, ash	71	*
200A	Charlevoix-Ensley complex, bedrock substratum, 0 to 3 percent slopes	8,545	0.7
201B	Sauxhead-Jacobsville complex, 0 to 6 percent slopes, very stony	558	*
202B	Sauxhead sandy loam, 1 to 6 percent slopes, very stony	817	*
203A	Au Gres-Deford complex, 0 to 3 percent slopes	1,953	0.2
204B	Gogebic-Tula complex, 1 to 6 percent slopes, very stony	925	*
206B	Traunik gravelly fine sandy loam, 1 to 6 percent slopes	418	*
207D	Dishno-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery	21,260	1.8
208F	Keewaydin-Michigamme cobbly fine sandy loams, 18 to 45 percent slopes, rocky, very bouldery	4,322	0.4
209B	Garlic-Fence complex, 1 to 6 percent slopes	4,836	0.4
M-W	Miscellaneous water	58	*
W	Water	35,102	2.9
	Total	1,198,912	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
10B:						
Grayling------------	6s	---	---	---	---	---
10D, 10E:						
Grayling------------	7s	---	---	---	---	---
11C, 11D:						
Deer Park-----------	7s	---	---	---	---	---
12B:						
Rubicon-------------	6s	---	---	---	---	---
12D, 12E, 12F:						
Rubicon-------------	7s	---	---	---	---	---
13B:						
Kalkaska------------	4s	---	---	---	---	---
13D:						
Kalkaska------------	6s	---	---	---	---	---
13E, 13F:						
Kalkaska------------	7s	---	---	---	---	---
14B:						
Rousseau------------	3s	---	---	---	---	---
14D:						
Rousseau------------	4e	---	---	---	---	---
15A:						
Croswell------------	4s	---	---	---	---	---
16A:						
Paquin--------------	6s	---	---	---	---	---
17A:						
Au Gres-------------	4w	---	---	---	---	---
18:						
Kinross-------------	6w	---	---	---	---	---
19:						
Deford--------------	5w	---	---	2.3	---	---
20B------------------		2.8	10	2.3	50	---
Rousseau------------	3s					
Ocqueoc-------------	3s					
20D------------------		2.5	8	---	35	---
Rousseau------------	4e					
Ocqueoc-------------	4e					
20E------------------		---	---	---	---	---
Rousseau------------	7e					
Ocqueoc-------------	7e					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
22B:						
Alcona-------------	2e	3.5	13	---	75	---
24B:						
Munising-----------	2e	3.5	13	2.6	70	350
24D:						
Munising-----------	4e	3.0	---	2.3	55	---
25B----------------		3.0	12	2.3	65	300
Munising-----------	2e					
Yalmer-------------	3s					
25D----------------		2.5	---	1.9	50	---
Munising-----------	4e					
Yalmer-------------	4e					
26A:						
Skanee-------------	2w	---	---	3.4	75	---
27:						
Gay----------------	6s	---	---	---	---	---
28B:						
Keweenaw-----------	3e	3.0	10	2.3	60	250
28D:						
Keweenaw-----------	4e	2.4	---	---	---	---
28E:						
Keweenaw-----------	7e	---	---	---	---	---
29B:						
Yalmer-------------	3s	3.0	11	2.3	60	30
29D:						
Yalmer-------------	4e	2.5	---	1.9	45	---
31D:						
Trenary------------	4e	3.8	---	2.9	60	---
32A:						
Charlevoix---------	2w	---	---	4.0	80	---
33:						
Ensley-------------	5w	---	---	2.6	---	---
34B:						
Onaway-------------	2e	4.0	16	3.0	80	350
34D:						
Onaway-------------	4e	3.8	---	2.9	60	---
34E:						
Onaway-------------	6e	3.5	---	---	---	---
35B:						
Champion-----------	5s	---	---	---	---	---
35D:						
Champion-----------	6s	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
36A:						
Net	7s	---	---	---	---	---
37:						
Witbeck	7s	---	---	---	---	---
38B:						
Pence	3e	---	---	---	---	---
38D:						
Pence	6e	---	---	---	---	---
38E:						
Pence	7e	---	---	---	---	---
39B:						
Amasa	2e	---	---	---	---	---
39D:						
Amasa	4e	---	---	---	---	---
39E:						
Amasa	7e	---	---	---	---	---
40B, 40D:						
Waiska	6s	---	---	---	---	---
41A:						
Channing	3w	---	---	---	---	---
42:						
Minocqua	6w	---	---	---	---	---
43B:						
Karlin	3s	---	---	---	---	---
43D:						
Karlin	4e	---	---	---	---	---
44B:						
Carlshend	3s	---	---	---	---	---
45A:						
Zeba	5s	---	---	---	---	---
46:						
Jacobsville	6s	---	---	---	---	---
48:						
Burt	7w	---	---	---	---	---
50A:						
Sundell	3w	---	---	---	---	---
51:						
Nahma	5w	---	---	---	---	---
52B:						
Summerville	3s	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
55F		---	---	---	---	---
Michigamme	7s					
Rock outcrop	8					
56D, 56E, 56F		---	---	---	---	---
Peshekee	7s					
Rock outcrop	8					
57		---	---	---	---	---
Carbondale	6w					
Tawas	6w					
58		---	---	---	---	---
Greenwood	7w					
Dawson	7w					
59		---	---	---	---	---
Chippeny	7w					
Nahma	5w					
60		---	---	---	---	---
Histosols	6w					
Aquents	6w					
61. Pits, borrow						
62B. Udorthents and Udipsamments						
64. Pits and Dumps						
65B. Udorthents-Urban land						
66B. Udipsamments-Urban land						
67B		---	---	---	---	---
Urban land.						
Rubicon	6s					
68. Pits, quarries						
69B: Escanaba	3s	3.5	12	2.6	70	300
69D: Escanaba	4e	3.5	---	2.3	55	---
70B: Nadeau	3s	3.0	10	---	60	250
70D: Nadeau	4e	2.6	---	2.0	45	---

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
71B		---	---	---	---	---
Evart	7w					
Pelkie	4s					
Sturgeon	3w					
72B:						
Emmet	2e	3.8	13	2.9	75	350
72D:						
Emmet	4e	3.3	---	2.5	60	---
72E:						
Emmet	7e	---	---	---	---	---
73B, 73D:						
Gogebic	6s	---	---	---	---	---
74D		---	---	---	---	---
Schweitzer	6s					
Michigamme	6s					
Rock outcrop	8					
74F		---	---	---	---	---
Schweitzer	7s					
Michigamme	6s					
Rock outcrop	8					
76C		---	---	---	---	---
Garlic	6s					
Alcona	3e					
Voelker	6s					
76E		---	---	---	---	---
Garlic	7s					
Alcona	6e					
Voelker	7s					
76F		---	---	---	---	---
Garlic	7s					
Alcona	7e					
Voelker	7s					
77D		---	---	---	---	---
Garlic	6s					
Alcona	4e					
Voelker	6s					
77E		---	---	---	---	---
Garlic	7s					
Alcona	7e					
Voelker	7s					
78C		2.8	9	---	50	---
Keweenaw	3e					
Kalkaska	6s					
78E		---	---	---	---	---
Keweenaw	6e					
Kalkaska	7s					
78F		---	---	---	---	---
Keweenaw	7e					
Kalkaska	7s					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
79B		2.8	10	2.2	60	275
Keweenaw	3e					
Munising	2e					
80B		---	---	---	---	---
Sayner	4s					
Rubicon	6s					
80D, 80E		---	---	---	---	---
Sayner	7s					
Rubicon	7s					
81B, 81D:						
Pelissier	6s	---	---	---	---	---
81E:						
Pelissier	7s	---	---	---	---	---
84D		---	---	---	---	---
Rubicon	7s					
Ishpeming	6s					
Rock outcrop	8					
84F		---	---	---	---	---
Rubicon	7s					
Ishpeming	7s					
Rock outcrop	8					
85A:						
Solona	2w	---	---	3.5	70	---
86B:						
Mashek	2e	3.8	15	2.9	75	---
87B:						
Cunard	2e	3.0	11	---	70	275
88		---	---	---	---	---
Cathro	6w					
Ensley	5w					
89B		3.8	13	2.7	75	---
Emmet	2e					
Solona	2w					
90B		3.6	15	---	75	---
Emmet	2e					
Escanaba	3s					
90D		3.0	---	---	---	---
Emmet	4e					
Escanaba	4e					
91B		3.5	12	2.6	70	325
Onaway	2e					
Nadeau	3s					
92A		---	---	---	---	---
Ensley	5w					
Solona	2w					
93		---	---	---	---	---
Tawas	6w					
Deford	5w					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
94B		2.5	9	1.9	45	250
Keweenaw	3e					
Kalkaska	4s					
94D		2.1	---	1.6	35	---
Keweenaw	4e					
Kalkaska	6s					
94E		---	---	---	---	---
Keweenaw	7e					
Kalkaska	7s					
95B:						
Liminga	3s	2.5	10	1.9	40	---
95D:						
Liminga	3e	2.1	---	1.6	35	---
100E		---	4	---	25	---
Sayner	7s					
Rubicon	7s					
100F		---	---	---	---	---
Sayner	7s					
Rubicon	7s					
103D		---	---	---	---	---
Rubicon	7s					
Ocqueoc	7e					
Rock outcrop	8					
104C:						
Fence	3e	4.0	15	3.0	80	350
105C:						
Munising	3e	3.5	10	2.6	65	300
106B		---	---	---	---	---
Sagola	6s					
Rubicon	6s					
106D		---	---	---	---	---
Sagola	6s					
Rubicon	7s					
107B		3.5	13	2.6	70	350
Goodman	6s					
Sundog	6s					
107D		3.2	---	2.4	55	---
Goodman	6s					
Sundog	7s					
107F		---	---	---	---	---
Goodman	7s					
Sundog	7s					
108B		3.5	13	2.6	70	---
Goodman	6s					
Sundog	6s					
Wabeno	6s					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
108D		3.2	10	2.4	55	---
Goodman	6s					
Sundog	7s					
Wabeno	6s					
109B, 109D, 109F		---	---	---	---	---
Rubicon	7s					
Keweenaw	7s					
110B		3.0	10	2.3	60	275
Nadeau	3s					
Mancelona	3s					
110D		2.6	---	2.0	45	---
Nadeau	4e					
Mancelona	4e					
111B:						
Grayling	6s	---	---	---	---	---
112D, 112F		---	---	---	---	---
Keewaydin	7s					
Michigamme	7s					
Rock outcrop	8					
113B, 113D, 113F:						
Vanriper	7s	---	---	---	---	---
114B, 114D, 114F:						
Vanriper	7s	---	---	---	---	---
117B:						
Fence	2e	---	14	---	75	---
118A		---	---	---	---	---
Croswell	4s					
Deford	5w					
119B		---	---	---	---	---
Yalmer	3s					
Kalkaska	4s					
119D		---	---	---	---	---
Yalmer	4e					
Kalkaska	6s					
121B:						
Onota	3e	---	---	---	---	---
122:						
Pleine	7s	---	---	---	---	---
123A:						
Tula	7s	---	---	---	---	---
124B, 124D		---	---	---	---	---
Gogebic	6s					
Dishno	6s					
125D, 125F		---	---	---	---	---
Keweenaw	7s					
Kalkaska	7s					
Rock outcrop	8					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
126B:						
Sundog	2e	3.0	---	2.3	70	275
126D:						
Sundog	4e	2.6	---	2.0	55	---
126E:						
Sundog	7e	---	---	---	---	---
127B:						
Sundog	6s	---	---	---	---	---
127D, 127F:						
Sundog	7s	---	---	---	---	---
128B		---	---	---	---	---
Kalkaska	4s					
Waiska	6s					
128D		---	---	---	---	---
Kalkaska	6s					
Waiska	6s					
128E		---	---	---	---	---
Kalkaska	7s					
Waiska	6s					
129C		---	---	---	---	---
Kalkaska	6s					
Munising	3e					
130A:						
Chabeneau	3s	---	---	---	---	---
131B		---	---	---	---	---
Witbeck	7s					
Cathro	7s					
132.						
Slickens						
133B, 133D		---	---	---	---	---
Keewaydin	6s					
Dishno	6s					
134B, 134D:						
Keewaydin	6s	---	---	---	---	---
134F:						
Keewaydin	7s	---	---	---	---	---
135A		---	---	---	---	---
Witbeck	7s					
Net	7s					
136A		---	---	---	---	---
Minocqua	6w					
Channing	3w					
137D, 137F		---	---	---	---	---
Keewaydin	7s					
Sundog	7s					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
138D, 138F		---	---	---	---	---
Sundog	7s					
Rock outcrop	8					
139B, 139D:						
Sundog	7s	---	---	---	---	---
140B		---	---	---	---	---
Champion	5s					
Dishno	6s					
140D		---	---	---	---	---
Champion	6s					
Dishno	6s					
141D		---	---	---	---	---
Pelissier	7s					
Rock outcrop	8					
142B, 142D:						
Pelissier	6s	---	---	---	---	---
144B:						
Farquar	6s	---	---	---	---	---
145C		3.0	---	2.3	65	300
Munising	6s					
Yalmer	6s					
146B		---	---	2.6	70	---
Munising	2e					
Skanee	2w					
147A		---	---	---	---	---
Skanee	5s					
Gay	6s					
148B		---	---	---	---	---
Shoepac	3s					
Ensley	5w					
149		---	---	---	---	---
Evart	7w					
Cathro	6w					
150:						
Shag	5w	---	---	---	---	---
151:						
Spear	2w	---	---	---	---	---
153D, 153F		---	---	---	---	---
Ishpeming	7s					
Rock outcrop	8					
154B		---	---	---	---	---
Rubicon	6s					
Sayner	4s					
154D		---	---	---	---	---
Rubicon	7s					
Sayner	7s					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
155A		---	---	---	---	---
Zeba	5s					
Jacobsville	6s					
156B:						
Duel	6s	---	---	---	---	---
157B		---	---	---	---	---
Reade	3s					
Nahma	5w					
158C		---	---	---	---	---
Munising	3e					
Onota	4e					
Yalmer	3e					
159A:						
Jeske	7w	---	---	---	---	---
160B		---	---	---	---	---
Paquin	6s					
Finch	4w					
161B:						
Yellowdog	7s	---	---	---	---	---
162B:						
Buckroe	7s	---	---	---	---	---
165B		---	---	---	---	---
Chocolay	7s					
Waiska	6s					
166:						
Skandia	7w	---	---	---	---	---
167		---	---	---	---	---
Skandia	7w					
Jacobsville	5w					
168B		---	---	---	---	---
Yellowdog	7s					
Burt	7w					
170B:						
Chocolay	7s	---	---	---	---	---
171B:						
Paavola	6s	---	---	---	---	---
172D, 172F		---	---	---	---	---
Buckroe	7s					
Rock outcrop	8					
173B:						
Pence	6s	---	---	---	---	---
173D:						
Pence	7s	---	---	---	---	---
174D		---	---	---	---	---
Yalmer	3e					
Rubicon	6s					
Urban land.						

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
175E, 175F		---	---	---	---	---
Kalkaska	7s					
Waiska	6s					
176B		---	---	---	---	---
Greenwood	7w					
Croswell	4s					
177E:						
Frohling	6e	---	---	---	---	---
177F:						
Frohling	7e	---	---	---	---	---
178D		---	---	---	---	---
Schweitzer	7s					
Kalkaska	6s					
Rock outcrop	8					
178F		---	---	---	---	---
Schweitzer	7s					
Kalkaska	7s					
Rock outcrop	8					
179E		---	---	---	---	---
Schweitzer	7s					
Michigamme	7s					
180E		---	---	---	---	---
Kalkaska	7s					
Frohling	6e					
180F		---	---	---	---	---
Kalkaska	7s					
Frohling	7e					
181E, 181F		---	---	---	---	---
Frohling	7s					
Tokiahok	7s					
184C		---	---	---	---	---
Dishno	6s					
Witbeck	7s					
Rock outcrop	8					
185B:						
Northland	3s	3.0	11	---	60	---
187B:						
Reade	3s	---	---	---	---	---
190B		3.4	13	2.6	70	300
Emmet	2e					
Cunard	23					
191B		---	---	---	---	---
Nahma	5w					
Sundell	3w					
193E		---	---	---	---	---
Frohling	7e					
Tokiahok	7e					

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn silage	Grass-legume hay	Oats	Irish potatoes
		Tons	Tons	Tons	Bu	Cwt
194E:						
Sporley	6e	---	---	---	---	---
196E		---	---	---	---	---
Frohling	7e					
Onota	7e					
Tokiahok	7e					
197B		4.0	14	3.0	75	350
Shoepac	3s					
Trenary	2e					
198B		---	---	---	---	---
Shoepac	3s					
Reade	3s					
199.						
Udorthents, ash						
200A		---	---	---	---	---
Charlevoix	2w					
Ensley	5w					
201B		---	---	---	---	---
Sauxhead	7s					
Jacobsville	6s					
202B:						
Sauxhead	7s	---	---	---	---	---
203A		---	---	---	---	---
Au Gres	4w					
Deford	5w					
204B		---	---	---	---	---
Gogebic	6s					
Tula	7s					
206B:						
Traunik	6s	---	---	---	---	---
207D		---	---	---	---	---
Dishno	6s					
Michigamme	7s					
Rock outcrop	8					
208F		---	---	---	---	---
Keewaydin	7s					
Michigamme	7s					
209B		---	---	---	---	---
Garlic	4s					
Fence	2e					
M-W.						
Miscellaneous water						
W.						
Water						

Table 6.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
1	---	---	---	---
2	74,096	56,155	17,941	---
3	90,524	38,435	9,262	42,827
4	86,717	30,138	10,030	46,549
5	46,033	---	36,145	9,888
6	347,956	14,816	151,145	181,995
7	309,996	13,348	36,263	260,355

Table 7.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
22B	Alcona loamy very fine sand, 1 to 6 percent slopes
32A	Charlevoix silt loam, 0 to 3 percent slopes (where drained)
33	Ensley muck (where drained)
34B	Onaway fine sandy loam, 1 to 6 percent slopes
39B	Amasa very fine sandy loam, 1 to 6 percent slopes
42	Minocqua muck (where drained)
72B	Emmet fine sandy loam, 1 to 6 percent slopes
85A	Solona fine sandy loam, 0 to 3 percent slopes (where drained)
86B	Mashek fine sandy loam, 0 to 4 percent slopes
89B	Emmet-Solona fine sandy loams, 0 to 6 percent slopes (where drained)
90B	Emmet-Escanaba complex, 1 to 6 percent slopes
92A	Ensley-Solona complex, 0 to 3 percent slopes (where drained)
117B	Fence very fine sandy loam, 1 to 6 percent slopes
126B	Sundog silt loam, 1 to 6 percent slopes
130A	Chabeneau silt loam, 0 to 3 percent slopes
136A	Minocqua-Channing complex, 0 to 3 percent slopes (where drained)
151A	Spear very fine sandy loam, 0 to 3 percent slopes (where drained)
187B	Reade silt loam, 0 to 4 percent slopes (where drained)
197B	Shoepac-Trenary silt loams, 1 to 6 percent slopes
198B	Shoepac-Reade silt loams, 1 to 4 percent slopes (where drained)
200A	Charlevoix-Ensley complex, bedrock substratum, 0 to 3 percent slopes (where drained)

Table 8.--Woodland Management and Productivity

(An asterisk indicates the indicator species. See text for an explanation of terms used in this table)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
10B:										
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Jack pine*----------	48	57	Jack pine, red pine
							Northern red oak----	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine------------	---	---	
10D:										
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Jack pine*----------	48	57	Jack pine, red pine
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine------------	---	---	
10E:										
Grayling----------------	4R	Moderate	Moderate	Moderate	Slight	Slight	Jack pine*----------	48	57	Jack pine, red pine
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine------------	---	---	
11C:										
Deer Park---------------	4S	Slight	Moderate	Moderate	Slight	Slight	Black cherry--------	---	---	Jack pine, red pine
							Eastern white pine--	---	---	
							Jack pine*----------	46	57	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red pine------------	45	57	
11D:										
Deer Park---------------	4S	Slight	Moderate	Moderate	Slight	Slight	Black cherry--------	---	---	Jack pine, red pine
							Eastern white pine--	---	---	
							Jack pine*----------	46	57	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red pine------------	45	57	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
12B:										
Rubicon-----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	---	
							Jack pine-----------	53	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	---	
							Red maple-----------	57	---	
							Red pine------------	53	---	
12D:										
Rubicon-----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	86	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	72	
12E:										
Rubicon-----------------	4R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	86	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	72	
12F:										
Rubicon-----------------	4R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
13B:										
Kalkaska----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
13D:										
Kalkaska----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
13E:										
Kalkaska----------------	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
13F:										
Kalkaska----------------	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
14B:										
Rousseau	5S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine,
							Bigtooth aspen	66	72	red pine
							Eastern hemlock	---	---	
							Jack pine	62	86	
							Northern red oak	---	---	
							Paper birch	65	72	
							Quaking aspen*	65	72	
							Red maple	60	43	
							Red pine	---	---	
							Yellow birch	---	---	
14D:										
Rousseau	5S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine,
							Bigtooth aspen	66	72	red pine
							Eastern hemlock	---	---	
							Jack pine	62	86	
							Northern red oak	---	---	
							Paper birch	65	72	
							Quaking aspen*	65	72	
							Red maple	60	43	
							Red pine	---	---	
							Yellow birch	---	---	
15A:										
Croswell	5S	Slight	Moderate	Moderate	Moderate	Moderate	Bigtooth aspen	69	86	Eastern white pine,
							Black cherry	---	---	red pine, white
							Eastern white pine	---	---	spruce
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	54	57	
							Quaking aspen*	68	72	
							Red maple	---	---	
							Red pine	55	86	
16A:										
Paquin	3S	Slight	Moderate	Moderate	Slight	Slight	Black cherry	---	---	Eastern white pine,
							Eastern hemlock	---	---	white spruce
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	64	43	
							Red pine	67	114	
							Sugar maple*	58	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to manage
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	
									cu ft/ac	
17A:										
Au Gres	6W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Jack pine	51	72	
							Paper birch	---	---	
							Quaking aspen*	70	86	
							Red maple	65	43	
							Yellow birch	---	---	
18:										
Kinross	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Tamarack, white spruce
							Black spruce	---	---	
							Eastern white pine	---	---	
							Jack pine	---	---	
							Paper birch	---	---	
							Quaking aspen*	45	29	
							Red maple	---	---	
							Tamarack	---	---	
19:										
Deford	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern white pine, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen*	60	57	
							Red maple	64	43	
							White spruce	---	---	
20B:										
Rousseau	5S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, red pine
							Bigtooth aspen	66	72	
							Eastern hemlock	---	---	
							Jack pine	62	86	
							Northern red oak	---	---	
							Paper birch	65	72	
							Quaking aspen*	65	72	
							Red maple	60	43	
							Red pine	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
20B:										
Ocqueoc	3S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	65	71	
							Red maple	---	---	
							Red pine	---	---	
20D:										
Rousseau	5S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, red pine
							Bigtooth aspen	66	72	
							Eastern hemlock	---	---	
							Jack pine	62	86	
							Northern red oak	---	---	
							Paper birch	65	72	
							Quaking aspen*	65	72	
							Red maple	60	43	
							Red pine	---	---	
							Yellow birch	---	---	
Ocqueoc	3S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	65	71	
							Red maple	---	---	
							Red pine	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
20E:										
Rousseau----------------	5R	Moderate	Moderate	Moderate	Slight	Slight	Balsam fir----------	---	---	Eastern white pine,
							Bigtooth aspen------	66	72	red pine
							Eastern hemlock-----	---	---	
							Jack pine-----------	62	86	
							Northern red oak----	---	---	
							Paper birch---------	65	72	
							Quaking aspen*------	65	72	
							Red maple-----------	60	43	
							Red pine------------	---	---	
							Yellow birch--------	---	---	
Ocqueoc-----------------	3R	Moderate	Moderate	Moderate	Slight	Slight	Balsam fir----------	---	---	Eastern white pine,
							Eastern hemlock-----	---	---	red pine, white
							Eastern white pine--	---	---	spruce
							Jack pine-----------	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	65	5	
							Red maple-----------	---	---	
							Red pine------------	---	---	
22B:										
Alcona------------------	3	Slight	Moderate	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine,
							Eastern white pine--	---	---	red pine, white
							Northern red oak----	---	---	spruce
							Red maple-----------	---	---	
							Red pine------------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
24B:										
Munising----------------	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir----------	---	---	Norway spruce,
							Eastern hemlock-----	---	---	eastern white
							Paper birch---------	---	---	pine, red pine,
							Quaking aspen-------	---	---	white spruce
							Red maple-----------	---	---	
							Sugar maple*--------	63	43	
							White spruce--------	---	---	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
24D:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	
25B:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	American beech	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
25D:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
25D:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
26A:										
Skanee	3W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	60	43	
							Sugar maple	60	43	
							Yellow birch	---	---	
27:										
Gay	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	53	100	Eastern arborvitae, tamarack, white spruce
							Black spruce	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	
28B:										
Keweenaw	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
28D:										
Keweenaw	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	
28E:										
Keweenaw	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	
29B:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
29D:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
31D:										
Trenary	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	65	57	Eastern white pine, red pine, white spruce
							American beech	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	61	43	
32A:										
Charlevoix	3W	Slight	Severe	Slight	Moderate	Severe	Balsam fir	---	---	Norway spruce, eastern white pine, white spruce
							Black ash	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	65	43	
							White spruce	---	---	
33:										
Ensley	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	60	114	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Red maple*	62	43	
							White ash	---	---	
							White spruce	---	---	
							Yellow birch	---	---	
34B:										
Onaway	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	65	43	Norway spruce, eastern white pine, northern red oak, red pine, white spruce
							Balsam fir	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	57	
							White ash	---	---	
							Yellow birch	---	---	
34D:										
Onaway	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	65	57	Norway spruce, eastern white pine, northern red oak, red pine, white spruce
							Balsam fir	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	43	
							White ash	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
34E:										
Onaway	3R	Moderate	Moderate	Slight	Slight	Severe	American basswood	65	43	Norway spruce, eastern white pine, northern red oak, red pine, white spruce
							Balsam fir	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	57	
							White ash	---	---	
							Yellow birch	---	---	
35B:										
Champion	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
35D:										
Champion	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
36A:										
Net	3X	Slight	Severe	Moderate	Severe	Severe	Balsam fir	58	114	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	53	57	
							Quaking aspen	---	---	
							Red maple*	60	43	
							White spruce	49	100	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
37:										
Witbeck	3X	Slight	Severe	Severe	Severe	Severe	Balsam fir	48	86	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Black spruce*	48	43	
							Eastern arborvitae	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Tamarack	---	---	
							White spruce	40	29	
							Yellow birch	41	72	
38B:										
Pence	3A	Slight	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	57	114	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
38D:										
Pence	3A	Moderate	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	57	114	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
							Yellow birch	---	---	
38E:										
Pence	3R	Moderate	Moderate	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	57	114	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
39B:										
Amasa	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	70	72	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
39D:										
Amasa	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	70	72	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
39E:										
Amasa	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	70	72	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
40B:										
Waiska	3A	Slight	Slight	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
40D:										
Waiska	3A	Slight	Slight	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	
41A:										
Channing	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Black spruce	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							White spruce	---	---	
							Yellow birch	---	---	
42:										
Minocqua	7W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	54	100	Tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen	---	---	
							Red maple	55	29	
							Tamarack	55	57	
43B:										
Karlin	3A	Slight	Slight	Slight	Slight	Moderate	Bigtooth aspen	---	---	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Red pine*	65	114	
43D:										
Karlin	3A	Slight	Slight	Slight	Slight	Moderate	Bigtooth aspen	---	---	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Red pine*	65	114	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber (cu ft/ac)	Trees to manage
44B:										
Carlshend	3D	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	65	43	
							Sugar maple*	62	43	
							Yellow birch	---	---	
45A:										
Zeba	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Sugar maple	---	---	
							White spruce	---	---	
							Yellow birch	---	---	
46:										
Jacobsville	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, tamarack, white spruce
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Yellow birch	---	---	
48:										
Burt	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, white spruce
							Black spruce	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen*	45	29	
							Red maple	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
50A:										
Sundell	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Norway spruce, white spruce
							Balsam poplar	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
51:										
Nahma	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	35	57	Eastern arborvitae, tamarack, white spruce
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
52B:										
Summerville	3D	Slight	Moderate	Moderate	Severe	Slight	Balsam fir	---	---	Eastern white pine, white spruce
							Basswood	---	---	
							Eastern white pine	48	86	
							Paper birch	53	57	
							Quaking aspen	---	---	
							Sugar maple*	62	43	
55F:										
Michigamme	3R	Severe	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	60	43	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
56D:										
Peshekee	2D	Slight	Moderate	Moderate	Severe	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	53	100	
							Paper birch	56	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	53	29	
							White spruce	---	---	
							Yellow birch	---	---	
Rock outcrop.										
56E:										
Peshekee	2R	Moderate	Severe	Moderate	Severe	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	53	100	
							Paper birch	56	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	53	29	
							White spruce	---	---	
							Yellow birch	---	---	
Rock outcrop.										
56F:										
Peshekee	2R	Severe	Severe	Moderate	Severe	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	53	100	
							Paper birch	56	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	53	29	
							White spruce	---	---	
							Yellow birch	---	---	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
57:										
Carbondale	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Red maple	---	---	
							Tamarack	---	---	
Tawas	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
58:										
Greenwood	2W	Slight	Severe	Severe	Severe	Severe	Black spruce*	15	29	---
							Tamarack	---	---	
Dawson	2W	Slight	Severe	Severe	Severe	Severe	Black spruce*	15	29	---
							Tamarack	---	---	
59:										
Chippeny	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir	35	57	Eastern arborvitae, tamarack
							Balsam poplar	---	---	
							Black ash	---	---	
							Black spruce	---	---	
							Eastern arborvitae*	35	57	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
Nahma	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	35	57	Eastern arborvitae, tamarack
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
60.										
Histosols and Aquents										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
61. Pits, borrow										
62B. Udorthents and Udipsamments										
64. Pits and Dumps										
65B. Udorthents-Urban land										
66B. Udipsamments-Urban land										
67B: Urban land.										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
68. Pits, quarries										
69B: Escanaba	3S	Slight	Moderate	Moderate	Slight	Moderate	Basswood	---	---	Red pine, white spruce
							Bigtooth aspen	---	---	
							Eastern white pine	75	172	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Plant competi- tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
69D:										
Escanaba----------------	3S	Slight	Moderate	Moderate	Slight	Moderate	Basswood-----------	---	---	Red pine, white spruce
							Bigtooth aspen------	---	---	
							Eastern white pine--	75	172	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	60	43	
70B:										
Nadeau------------------	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Bigtooth aspen------	63	72	
							Eastern white pine--	---	---	
							Paper birch---------	65	72	
							Quaking aspen-------	---	---	
							Sugar maple*--------	55	29	
70D:										
Nadeau------------------	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Bigtooth aspen------	63	72	
							Eastern white pine--	---	---	
							Paper birch---------	65	72	
							Quaking aspen-------	---	---	
							Sugar maple*--------	55	29	
71B:										
Evart-------------------	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir----------	40	72	Tamarack, white spruce
							Eastern arborvitae--	15	29	
							Eastern hemlock-----	---	---	
							Quaking aspen*------	45	29	
							Red maple-----------	40	14	
							Tamarack------------	35	29	
Pelkie------------------	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir----------	---	---	Norway spruce, red pine, white spruce
							Eastern hemlock-----	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	65	43	
							White spruce--------	---	---	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
71B:										
Sturgeon	3W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Norway spruce, eastern white pine, white spruce
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple*	65	43	
							Sugar maple	---	---	
							White spruce	---	---	
							Yellow birch	---	---	
72B:										
Emmet	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Bigtooth aspen	74	86	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	66	43	
							Yellow birch	---	---	
72D:										
Emmet	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Bigtooth aspen	74	86	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	66	43	
							Yellow birch	---	---	
72E:										
Emmet	3R	Moderate	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Bigtooth aspen	74	86	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	66	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
73B:										
Gogebic	3W	Slight	Severe	Moderate	Severe	Moderate	American basswood	66	57	Eastern white pine, white spruce
							Balsam fir	61	114	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	62	43	
73D:										
Gogebic	3W	Slight	Severe	Moderate	Severe	Moderate	American basswood	66	57	Eastern white pine, white spruce
							Balsam fir	61	114	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	62	43	
74D:										
Schweitzer	3X	Moderate	Moderate	Moderate	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							European white birch	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Eastern hophornbeam	---	---	
							Northern red oak	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	64	43	
							White ash	---	---	
Michigamme	3X	Moderate	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	---
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
74F:										
Schweitzer	3R	Severe	Severe	Moderate	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							European white birch	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Eastern hophornbeam	---	---	
							Northern red oak	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	64	43	
							White ash	---	---	
Michigamme	3R	Severe	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	---
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
Rock outcrop.										
76C:										
Garlic	3S	Slight	Moderate	Moderate	Slight	Moderate	Eastern hemlock	---	---	Eastern white pine, red pine
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
Alcona	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
76C:										
Voelker	3S	Slight	Moderate	Slight	Slight	Moderate	Black cherry	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
76E:										
Garlic	3R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern hemlock	---	---	Eastern white pine, red pine
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
Alcona	3R	Moderate	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Voelker	3R	Moderate	Moderate	Moderate	Slight	Moderate	Black cherry	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
76F:										
Garlic	3R	Severe	Severe	Severe	Slight	Moderate	Eastern hemlock	---	---	Eastern white pine, red pine
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
76F:										
Alcona------------------	3R	Severe	Severe	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Red maple-----------	---	---	
							Red pine------------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Voelker-----------------	3R	Severe	Severe	Moderate	Slight	Moderate	Black cherry--------	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
77D:										
Garlic------------------	3S	Moderate	Moderate	Moderate	Slight	Moderate	Eastern hemlock-----	---	---	Eastern white pine, red pine
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	62	43	
							Yellow birch--------	---	---	
Alcona------------------	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Red maple-----------	---	---	
							Red pine------------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Voelker-----------------	3S	Slight	Moderate	Slight	Slight	Moderate	Black cherry--------	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
77E:										
Garlic	3R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern hemlock	---	---	Eastern white pine, red pine
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
Alcona	3R	Moderate	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Voelker	3R	Moderate	Moderate	Moderate	Slight	Moderate	Black cherry	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
78C:										
Keweenaw	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
78E:										
Keweenaw----------------	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple-----------	50	29	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Kalkaska----------------	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
78F:										
Keweenaw----------------	3R	Severe	Severe	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple-----------	50	29	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Kalkaska----------------	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
79B:										
Keweenaw----------------	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple-----------	50	29	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Munising----------------	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir----------	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	63	43	
							White spruce--------	---	---	
							Yellow birch--------	---	---	
80B:										
Sayner------------------	7A	Slight	Slight	Slight	Slight	Slight	Eastern white pine*	57	114	Eastern white pine, jack pine, red pine
							Jack pine-----------	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine------------	59	100	
Rubicon-----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber (cu ft/ac)	Trees to manage
80D:										
Sayner	7A	Moderate	Slight	Moderate	Slight	Slight	Eastern white pine*	57	114	Eastern white pine, jack pine, red pine
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	59	100	
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
80E:										
Sayner	7R	Moderate	Moderate	Moderate	Slight	Slight	Eastern white pine*	57	114	Eastern white pine, jack pine, red pine
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	59	100	
Rubicon	4R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
81B:										
Pelissier---------------	8F	Slight	Slight	Slight	Slight	Slight	Balsam fir----------	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine*-----------	66	114	
							White spruce--------	---	---	
81D:										
Pelissier---------------	8F	Slight	Slight	Slight	Slight	Slight	Balsam fir----------	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine*-----------	66	114	
							White spruce--------	---	---	
81E:										
Pelissier---------------	8R	Moderate	Moderate	Moderate	Slight	Slight	Balsam fir----------	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine*-----------	66	114	
							White spruce--------	---	---	
84D:										
Rubicon-----------------	4R	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber (cu ft/ac)	Trees to manage
84D:										
Ishpeming	5R	Slight	Moderate	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Bigtooth aspen	68	72	
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	60	57	
							Quaking aspen*	63	72	
							Red maple	---	---	
							Sugar maple	---	---	
Rock outcrop.										
84F:										
Rubicon	4R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
Ishpeming	5R	Severe	Severe	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Bigtooth aspen	68	72	
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	60	57	
							Quaking aspen*	63	72	
							Red maple	---	---	
							Sugar maple	---	---	
Rock outcrop.										
85A:										
Solona	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	64	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
86B:										
Mashek	3D	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hophornbeam	---	---	
							Eastern white pine	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	63	43	
87B:										
Cunard	3D	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Eastern hophornbeam	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	43	
88:										
Cathro	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack, white spruce
							Black spruce	15	29	
							Eastern arborvitae	15	29	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Red maple	40	29	
							Tamarack	35	29	
							White spruce	---	---	
Ensley	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	60	114	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	Trees to manage
		Management concerns					Potential productivity			
									cu ft/ac	
89B:										
Emmet-------------------	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine,
							Balsam fir----------	---	---	northern red oak,
							Bigtooth aspen------	74	86	red pine, white
							Eastern hemlock-----	---	---	spruce
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	66	43	
							Yellow birch--------	---	---	
Solona------------------	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir----------	---	---	Eastern white pine,
							Eastern hemlock-----	---	---	white spruce
							Quaking aspen-------	---	---	
							Red maple*----------	64	43	
							Sugar maple---------	---	---	
							Yellow birch--------	---	---	
90B:										
Emmet-------------------	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine,
							Balsam fir----------	---	---	northern red oak,
							Bigtooth aspen------	74	86	red pine, white
							Eastern hemlock-----	---	---	spruce
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	66	43	
							Yellow birch--------	---	---	
Escanaba----------------	3S	Slight	Moderate	Moderate	Slight	Moderate	American basswood---	---	---	Northern red oak,
							Bigtooth aspen------	---	---	red pine, white
							Eastern white pine--	75	172	spruce
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	60	43	
90D:										
Emmet-------------------	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood---	---	---	Eastern white pine,
							American beech------	---	---	northern red oak,
							Bigtooth aspen------	74	86	red pine, white
							Eastern hemlock-----	---	---	spruce
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	66	43	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
90D:										
Escanaba	3S	Slight	Moderate	Moderate	Slight	Moderate	American basswood	---	---	Northern red oak, red pine, white spruce
							Bigtooth aspen	---	---	
							Eastern white pine	75	172	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
							Sugar maple*	60	43	
91B:										
Onaway	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	65	57	Eastern white pine, northern red oak, red pine, white spruce
							Balsam fir	---	---	
							Quaking aspen	---	---	
							Red pine	---	---	
							Sugar maple*	65	43	
							White ash	---	---	
							Yellow birch	---	---	
Nadeau	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, northern red oak, red pine
							Bigtooth aspen	63	72	
							Eastern white pine	---	---	
							Paper birch	65	72	
							Quaking aspen	---	---	
							Sugar maple*	55	29	
92A:										
Ensley	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	60	114	Eastern arborvitae, tamarack, white spruce
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	
Solona	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Quaking aspen	---	---	
							Red maple*	65	43	
							Sugar maple	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
93:										
Tawas	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
Deford	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern white pine, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen*	60	57	
							Red maple	64	43	
							White spruce	---	---	
94B:										
Keweenaw	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
94D:										
Keweenaw----------------	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple-----------	50	29	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Kalkaska----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
94E:										
Keweenaw----------------	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple-----------	50	29	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Kalkaska----------------	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to manage
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	
									cu ft/ac	
95B:										
Liminga	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	---	---	Eastern white pine, red pine
							Hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
95D:										
Liminga	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	---	---	Eastern white pine, red pine
							Hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
100E:										
Sayner	7R	Moderate	Moderate	Moderate	Slight	Slight	Eastern white pine*	57	114	Eastern white pine, jack pine, red pine
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	59	100	
Rubicon	4R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
100F:										
Sayner------------------	7R	Severe	Severe	Moderate	Slight	Slight	Eastern white pine*	57	114	Eastern white pine, jack pine, red pine
							Jack pine-----------	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Red pine------------	59	100	
Rubicon-----------------	4R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	86	
103D:										
Rubicon-----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine--	45	72	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	60	57	
							Red maple-----------	57	29	
							Red pine------------	53	86	
Occqueoc----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Balsam fir----------	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Jack pine-----------	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	65	71	
							Red maple-----------	---	---	
							Red pine------------	---	---	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
104C:										
Fence	3	Slight	Severe	Slight	Slight	Severe	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
105C:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	
106B:										
Sagola	4L	Slight	Moderate	Slight	Slight	Moderate	Bigtooth aspen	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Eastern white pine	---	---	
							Northern red oak*	63	57	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
106D:										
Sagola	4L	Slight	Moderate	Slight	Slight	Moderate	Bigtooth aspen	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Eastern white pine	---	---	
							Northern red oak*	63	57	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine	---	---	
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
107B:										
Goodman	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	68	57	Eastern white pine, northern red oak, red pine, white spruce
							Bigtooth aspen	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	69	43	
							Yellow birch	---	---	
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
107D:										
Goodman	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	68	57	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	69	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
107D:										
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
107F:										
Goodman	3R	Moderate	Moderate	Slight	Slight	Severe	American basswood	68	57	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	69	43	
							Yellow birch	---	---	
Sundog	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
108B:										
Goodman	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	68	57	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	69	43	
							Yellow birch	---	---	
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
108B:										
Wabeno	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	74	72	Eastern white pine, red pine, white spruce
							Sugar maple*	67	43	
							White ash	78	72	
							Yellow birch	72	43	
108D:										
Goodman	3L	Slight	Moderate	Slight	Slight	Severe	American basswood	68	57	Eastern white pine, red pine, white spruce
							Bigtooth aspen	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Sugar maple*	69	43	
							Yellow birch	---	---	
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
Wabeno	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	74	72	Eastern white pine, red pine, white spruce
							Sugar maple*	67	43	
							White ash	78	72	
							Yellow birch	72	43	
109B:										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
109B:										
Keweenaw	2A	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple*	50	29	
109D:										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
Keweenaw	2A	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple*	50	29	
109F:										
Rubicon	4R	Moderate	Severe	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
109F:										
Keweenaw----------------	2R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	64	57	
							Paper birch---------	60	57	
							Quaking aspen-------	---	---	
							Red maple*----------	50	29	
110B:										
Nadeau------------------	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Bigtooth aspen------	63	72	
							Eastern white pine--	---	---	
							Paper birch---------	65	72	
							Quaking aspen-------	---	---	
							Sugar maple*--------	55	29	
Mancelona---------------	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	---	---	
							Jack pine-----------	---	---	
							Quaking aspen-------	---	---	
							Red pine------------	---	---	
							Sugar maple*--------	58	43	
							Yellow birch--------	---	---	
110D:										
Nadeau------------------	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Bigtooth aspen------	63	72	
							Eastern white pine--	---	---	
							Paper birch---------	65	72	
							Quaking aspen-------	---	---	
							Sugar maple*--------	55	29	
Mancelona---------------	3A	Slight	Slight	Slight	Slight	Moderate	Balsam fir----------	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine--	---	---	
							Jack pine-----------	---	---	
							Red pine------------	---	---	
							Sugar maple*--------	58	43	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
111B:										
Grayling----------------	4S	Slight	Moderate	Moderate	Slight	Slight	Jack pine*----------	48	57	Jack pine, red pine
							Northern red oak----	---	---	
							Red pine------------	---	---	
112D:										
Keewaydin---------------	3X	Moderate	Moderate	Slight	Slight	Moderate	Eastern hemlock-----	---	---	Eastern white pine, white spruce
							Eastern white pine--	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Michigamme--------------	3X	Moderate	Moderate	Slight	Moderate	Moderate	Balsam fir----------	---	---	Eastern white pine, white spruce
							Bigtooth aspen------	---	---	
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	60	43	
							White spruce--------	---	---	
							Yellow birch--------	60	43	
Rock outcrop.										
112F:										
Keewaydin---------------	3R	Severe	Severe	Slight	Slight	Moderate	Eastern hemlock-----	---	---	Eastern white pine, white spruce
							Eastern white pine--	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Michigamme--------------	3R	Severe	Severe	Slight	Moderate	Moderate	Balsam fir----------	---	---	Eastern white pine, white spruce
							Bigtooth aspen------	---	---	
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	60	43	
							White spruce--------	---	---	
							Yellow birch--------	60	43	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
113B:										
Vanriper----------------	3X	Slight	Moderate	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	
113D:										
Vanriper----------------	3X	Slight	Moderate	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	
113F:										
Vanriper----------------	3R	Slight	Severe	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	
114B:										
Vanriper----------------	3X	Slight	Moderate	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	
114D:										
Vanriper----------------	3X	Slight	Moderate	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	
114F:										
Vanriper----------------	3R	Slight	Severe	Moderate	Slight	Moderate	American basswood---	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	43	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
117B:										
Fence	3L	Slight	Severe	Slight	Slight	Severe	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
118A:										
Croswell	5S	Slight	Moderate	Moderate	Moderate	Moderate	Bigtooth aspen	69	86	Eastern white pine, red pine, white spruce
							Black cherry	---	---	
							Eastern white pine	---	---	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	54	57	
							Quaking aspen*	68	72	
							Red maple	---	---	
							Red pine	55	86	
Deford	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern white pine, tamarack, white spruce
							Black spruce	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen*	60	57	
							Red maple	64	43	
119B:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber (cu ft/ac)	Trees to manage
119B:										
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
119D:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
121B:										
Onota	3D	Slight	Moderate	Slight	Moderate	Moderate	Eastern hemlock	---	---	Eastern white pine, white spruce
							Eastern white pine	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
122:										
Pleine	6W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	45	86	Eastern arborvitae, tamarack
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Red maple	---	---	
123A:										
Tula	3W	Slight	Severe	Moderate	Moderate	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple*	65	43	
							Sugar maple	---	---	
124B:										
Gogebic	3W	Slight	Severe	Moderate	Severe	Moderate	American basswood	66	57	Eastern white pine, white spruce
							Balsam fir	61	114	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	62	43	
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
124D:										
Gogebic	3W	Slight	Severe	Moderate	Severe	Moderate	American basswood	66	57	Eastern white pine, white spruce
							Balsam fir	61	114	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	62	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
124D:										
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
125D:										
Keweenaw	3X	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Kalkaska	3X	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	---	---	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Rock outcrop.										
125F:										
Keweenaw	3R	Severe	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	64	57	
							Paper birch	60	57	
							Quaking aspen	---	---	
							Red maple	50	29	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
125F:										
Kalkaska	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen	---	---	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Rock outcrop.										
126B:										
Sundog	2L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Red pine	75	143	
							White spruce	55	100	
126D:										
Sundog	2L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Red pine	75	143	
							White spruce	55	100	
126E:										
Sundog	2R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Red pine	75	143	
							White spruce	55	100	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
127B:										
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
127D:										
Sundog	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
127F:										
Sundog	3R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
128B:										
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
128B:										
Waiska	3A	Slight	Slight	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	
128D:										
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Waiska	3A	Slight	Slight	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	
128E:										
Kalkaska	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Waiska	3R	Moderate	Moderate	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
129C:										
Kalkaska----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
Munising----------------	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir----------	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	63	43	
							White spruce--------	---	---	
							Yellow birch--------	---	---	
130A:										
Chabeneau---------------	6L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir----------	53	100	Eastern white pine, red pine
							Black spruce--------	50	72	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Paper birch---------	---	---	
							Quaking aspen*------	73	86	
							Red maple-----------	50	29	
							Red pine------------	---	---	
							White spruce--------	55	100	
131:										
Witbeck-----------------	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir----------	48	86	Eastern arborvitae, tamarack, white spruce
							Black ash-----------	---	---	
							Black spruce*-------	48	43	
							Eastern arborvitae--	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Tamarack------------	40	29	
							White spruce--------	41	72	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
131:										
Cathro	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack, white spruce
							Black spruce	15	29	
							Eastern arborvitae	15	29	
							Paper birch	---	---	
							Red maple	40	29	
							Tamarack	35	29	
							White spruce	---	---	
132.										
Slickens										
133B:										
Keewaydin	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
133D:										
Keewaydin	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
134B:										
Keewaydin	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
134D:										
Keewaydin	3L	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
134F:										
Keewaydin	3R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
135A:										
Witbeck	3X	Slight	Severe	Severe	Severe	Severe	Balsam fir	48	86	Eastern arborvitae, white spruce
							Black ash	---	---	
							Black spruce*	48	43	
							Eastern arborvitae	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Tamarack	40	29	
							White spruce	41	72	
							Yellow birch	---	---	
Net	3X	Slight	Severe	Moderate	Severe	Severe	Balsam fir	58	114	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	53	57	
							Quaking aspen	---	---	
							Red maple*	60	43	
							White spruce	49	100	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
136A:										
Minocqua	7W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	54	100	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen	---	---	
							Red maple	55	29	
							Tamarack	55	57	
Channing	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							White spruce	---	---	
							Yellow birch	---	---	
137D:										
Keewaydin	3L	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Sundog	3L	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
137F:										
Keewaydin	3R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
137F:										
Sundog	3R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	65	72	
							Red maple	53	29	
							Red pine	75	143	
							Sugar maple*	62	43	
							White spruce	55	100	
138D:										
Sundog	2X	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Red pine	75	143	
							Sugar maple	---	---	
							White spruce	55	100	
Rock outcrop.										
138F:										
Sundog	2R	Severe	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Red pine	75	143	
							Sugar maple	---	---	
							White spruce	55	100	
Rock outcrop.										
139B:										
Sundog	2X	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	75	143	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Sugar maple	---	---	
							White spruce	55	100	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
139D:										
Sundog	2X	Slight	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	75	143	
							Quaking aspen	65	72	
							Red maple*	53	29	
							Sugar maple	---	---	
							White spruce	55	100	
140B:										
Champion	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
140D:										
Champion	3W	Slight	Severe	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
140D:										
Dishno	3W	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
141D:										
Pelissier	8F	Moderate	Severe	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	66	114	
							White spruce	---	---	
Rock outcrop.										
142B:										
Pelissier	8F	Slight	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	66	114	
							White spruce	---	---	
142D:										
Pelissier	8F	Slight	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	66	114	
							White spruce	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
144B:										
Farquar	4F	Slight	Slight	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Balsam poplar	---	---	
							Black spruce	---	---	
							Eastern white pine	---	---	
							Jack pine	---	---	
							Paper birch	---	---	
							Quaking aspen*	57	57	
							Red pine	---	---	
							White spruce	---	---	
145C:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
146B:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Norway spruce, eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
146B:										
Skanee	3W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	60	43	
							Sugar maple	60	43	
							Yellow birch	---	---	
147A:										
Skanee	3W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	60	43	
							Sugar maple	60	43	
							Yellow birch	---	---	
Gay	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	53	100	Eastern arborvitae, tamarack, white spruce
							Black spruce	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	
148B:										
Shoepac	3W	Slight	Moderate	Moderate	Moderate	Moderate	American basswood	---	---	Norway spruce, eastern white pine, red pine, white spruce
							American beech	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
Ensley	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	60	114	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
149:										
Evart	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	40	72	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae*	15	29	
							Red maple	40	14	
							Tamarack	35	29	
Cathro	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	40	72	Eastern arborvitae, tamarack, white spruce
							Eastern arborvitae	15	29	
							Paper birch	---	---	
							Red maple	40	29	
							Tamarack	35	29	
							White spruce	---	---	
150:										
Shag	5W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Tamarack, white spruce
							Black ash	---	---	
							Black spruce	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen*	61	72	
							Red maple	---	---	
							White spruce	---	---	
151A:										
Spear	3W	Slight	Severe	Slight	Moderate	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Quaking aspen	---	---	
							Red maple*	61	43	
							Tamarack	---	---	
							White spruce	---	---	
153D:										
Ishpeming	5X	Slight	Severe	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine
							Bigtooth aspen	68	72	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	60	57	
							Quaking aspen*	63	72	
							Red maple	---	---	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
153F:										
Ishpeming	5R	Severe	Severe	Moderate	Slight	Slight	Balsam fir	---	---	Eastern white pine
							Bigtooth aspen	68	72	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	60	57	
							Quaking aspen*	63	72	
							Red maple	---	---	
Rock outcrop.										
154B:										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
Sayner	7A	Slight	Slight	Slight	Slight	Slight	Eastern white pine	57	114	Eastern white pine, jack pine, red pine
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
154D:										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
154D:										
Sayner	7A	Moderate	Slight	Moderate	Slight	Slight	Eastern white pine	57	114	Eastern white pine, jack pine, red pine
							Jack pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
155A:										
Zeba	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Sugar maple	---	---	
							White spruce	---	---	
							Yellow birch	---	---	
Jacobsville	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Yellow birch	---	---	
156B:										
Duel	2D	Slight	Moderate	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Paper birch	47	43	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	53	29	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
157B:										
Reade	3D	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							White spruce	---	---	
							Yellow birch	---	---	
Nahma	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	35	57	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
158C:										
Munising	3W	Slight	Severe	Slight	Moderate	Moderate	American beech	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	63	43	
							White spruce	---	---	
							Yellow birch	---	---	
Onota	3D	Slight	Moderate	Slight	Moderate	Moderate	American beech	---	---	Eastern white pine, red pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber (cu ft/ac)	Trees to manage
158C:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	American beech	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
159A:										
Jeske	2D	Slight	Severe	Moderate	Severe	Slight	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple*	52	29	
							Yellow birch	---	---	
160B:										
Paquin	3S	Slight	Moderate	Moderate	Slight	Slight	Eastern hemlock	---	---	Eastern white pine, red pine, white spruce
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	64	43	
							Red pine	67	114	
							Sugar maple*	58	43	
							Yellow birch	---	---	
Finch	4W	Slight	Severe	Moderate	Severe	Severe	Black spruce	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Eastern white pine	53	100	
							Quaking aspen	56	57	
							Red maple*	56	29	
161B:										
Yellowdog	3D	Slight	Slight	Severe	Moderate	Slight	Eastern hemlock	---	---	Eastern white pine, white spruce
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
162B:										
Buckroe	3D	Slight	Slight	Moderate	Severe	Slight	Eastern hemlock	---	---	Eastern white pine, white spruce
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
165B:										
Chocolay	3F	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Waiska	3A	Slight	Slight	Slight	Slight	Slight	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	
166:										
Skandia	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae*	30	43	
							Eastern hemlock	---	---	
							Tamarack	---	---	
167:										
Skandia	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae*	30	43	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Tamarack	---	---	
Jacobsville	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, tamarack, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
168B:										
Yellowdog----------------	3D	Slight	Slight	Severe	Moderate	Slight	Eastern hemlock-----	---	---	Eastern white pine, white spruce
							Quaking aspen-------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Burt--------------------	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir----------	---	---	Eastern arborvitae, tamarack, white spruce
							Black spruce--------	---	---	
							Eastern arborvitae--	---	---	
							Eastern hemlock-----	---	---	
							Quaking aspen*------	45	29	
							Red maple-----------	---	---	
170B:										
Chocolay----------------	3F	Slight	Moderate	Slight	Moderate	Moderate	American basswood---	---	---	Eastern white pine, white spruce
							Balsam fir----------	---	---	
							Eastern hemlock-----	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
171B:										
Paavola-----------------	3W	Slight	Severe	Moderate	Moderate	Moderate	American basswood---	---	---	Eastern white pine, white spruce
							Eastern hemlock-----	---	---	
							Eastern hophornbeam-	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	63	43	
							Yellow birch--------	---	---	
172D:										
Buckroe-----------------	3D	Slight	Moderate	Moderate	Severe	Slight	Eastern hemlock-----	---	---	Eastern white pine, white spruce
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
172F:										
Buckroe	3R	Severe	Severe	Severe	Severe	Slight	Eastern hemlock	---	---	Eastern white pine, white spruce
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	
Rock outcrop.										
173B:										
Pence	3A	Slight	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	57	114	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
173D:										
Pence	3R	Moderate	Slight	Slight	Slight	Slight	Balsam fir	---	---	Eastern white pine, jack pine, red pine
							Eastern white pine	57	114	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Red pine*	59	100	
							Yellow birch	---	---	
174D:										
Yalmer	3D	Slight	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
174D:										
Rubicon	4S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen	66	72	Eastern white pine, jack pine, red pine
							Eastern white pine	45	72	
							Jack pine	53	72	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen*	60	57	
							Red maple	57	29	
							Red pine	53	86	
Urban land.										
175E:										
Kalkaska	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Waiska	3R	Moderate	Moderate	Moderate	Slight	Slight	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	71	86	
							Sugar maple*	61	43	
							Yellow birch	---	---	
175F:										
Kalkaska	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
175F:										
Waiska------------------	3R	Severe	Severe	Slight	Slight	Slight	American basswood---	---	---	Eastern white pine, red pine
							Balsam fir----------	---	---	
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	71	86	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
176B:										
Greenwood---------------	2W	Slight	Severe	Severe	Severe	Severe	Black spruce*-------	15	29	---
							Tamarack------------	---	---	
Croswell----------------	5S	Slight	Moderate	Moderate	Moderate	Moderate	Bigtooth aspen------	69	86	Eastern white pine, red pine, white spruce
							Black cherry--------	---	---	
							Eastern white pine--	---	---	
							Jack pine-----------	53	72	
							Northern red oak----	---	---	
							Paper birch---------	54	57	
							Quaking aspen*------	68	72	
							Red maple-----------	---	---	
							Red pine------------	55	86	
177E:										
Frohling----------------	3R	Moderate	Moderate	Slight	Severe	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	14	
							Yellow birch--------	---	---	
177F:										
Frohling----------------	3R	Severe	Severe	Moderate	Severe	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	14	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to manage
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	
									cu ft/ac	
178D:										
Schweitzer--------------	3D	Slight	Moderate	Moderate	Moderate	Moderate	American basswood---	---	---	Eastern white pine, red pine
							Balsam fir----------	---	---	
							Eastern hemlock-----	---	---	
							Northern red oak----	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	64	43	
Kalkaska----------------	3S	Slight	Moderate	Moderate	Slight	Slight	Bigtooth aspen------	---	---	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
Rock outcrop.										
178F:										
Schweitzer--------------	3R	Severe	Severe	Moderate	Moderate	Moderate	American basswood---	---	---	Eastern white pine, red pine
							Balsam fir----------	---	---	
							Eastern hemlock-----	---	---	
							Northern red oak----	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Sugar maple*--------	64	43	
Kalkaska----------------	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	---	---	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
Rock outcrop.										

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Trees to manage
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	
									cu ft/ac	
179E:										
Schweitzer	3R	Moderate	Moderate	Moderate	Moderate	Moderate	American basswood	---	---	Eastern white pine, red pine
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Northern red oak	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	64	43	
Michigamme	3R	Moderate	Moderate	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
180E:										
Kalkaska	3R	Moderate	Moderate	Moderate	Slight	Slight	Bigtooth aspen	80	100	Eastern white pine, red pine
							Eastern white pine	---	---	
							Northern red oak	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	63	43	
							Red pine	---	---	
							Sugar maple*	64	43	
Frohling	3R	Moderate	Moderate	Slight	Severe	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Black cherry	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	14	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
180F:										
Kalkaska----------------	3R	Severe	Severe	Moderate	Slight	Slight	Bigtooth aspen------	80	100	Eastern white pine, red pine
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	63	43	
							Red pine------------	---	---	
							Sugar maple*--------	64	43	
Frohling----------------	3R	Severe	Severe	Moderate	Severe	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	14	
							Yellow birch--------	---	---	
181E:										
Frohling----------------	3R	Moderate	Moderate	Slight	Severe	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	14	
							Yellow birch--------	---	---	
Tokiahok----------------	3R	Moderate	Moderate	Moderate	Moderate	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Eastern hemlock-----	---	---	
							Paper birch---------	---	---	
							Quaking aspen-------	---	---	
							Red maple-----------	61	43	
							Sugar maple*--------	61	43	
							Yellow birch--------	---	---	
181F:										
Frohling----------------	3R	Severe	Severe	Moderate	Severe	Moderate	Balsam fir----------	---	---	Eastern white pine, red pine
							Black cherry--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Quaking aspen-------	---	---	
							Sugar maple*--------	60	14	
							Yellow birch--------	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
181F:										
Tokiahok	3R	Severe	Severe	Moderate	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	61	43	
							Sugar maple	61	43	
							Yellow birch	---	---	
184C:										
Dishno	3X	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
Witbeck	3X	Slight	Severe	Severe	Severe	Severe	Balsam fir	48	86	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Black spruce*	48	43	
							Eastern arborvitae	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Tamarack	40	29	
							White spruce	41	72	
							Yellow birch	---	---	
Rock outcrop.										
185B:										
Northland	5L	Slight	Moderate	Slight	Moderate	Moderate	Quaking aspen*	65	72	Eastern white pine, red pine
							Balsam fir	---	---	
							Paper birch	---	---	
							Sugar maple	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
187B:										
Reade	3D	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	---	---	
190B:										
Emmet	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, northern red oak, red pine, white spruce
							Bigtooth aspen	74	86	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	66	43	
							Yellow birch	---	---	
Cunard	3D	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Eastern hophornbeam	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	43	
191B:										
Nahma	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir*	35	57	Eastern arborvitae, tamarack, white spruce
							Balsam poplar	---	---	
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
Sundell	2W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Norway spruce, white spruce
							Balsam poplar	---	---	
							Eastern arborvitae	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
193E:										
Frohling	3R	Moderate	Moderate	Slight	Severe	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	14	
							Yellow birch	---	---	
Tokiahok	3R	Moderate	Moderate	Moderate	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	61	43	
							Sugar maple*	61	43	
							Yellow birch	---	---	
194E:										
Sporley	3R	Moderate	Severe	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine
							Bigtooth aspen	---	---	
							Eastern hophornbeam	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
196E:										
Frohling	3R	Moderate	Moderate	Slight	Severe	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
Onota	3R	Moderate	Moderate	Slight	Moderate	Moderate	American beech	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
196E:										
Tokiahok	3R	Moderate	Moderate	Moderate	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, red pine
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	61	43	
							Sugar maple	61	43	
							Yellow birch	---	---	
197B:										
Shoepac	3W	Slight	Moderate	Moderate	Moderate	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							American beech	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
Trenary	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	65	57	Eastern white pine, red pine, white spruce
							American beech	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	61	43	
							Yellow birch	61	43	
198B:										
Shoepac	3W	Slight	Moderate	Moderate	Severe	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							American beech	---	---	
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
Reade	3D	Slight	Moderate	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Balsam fir	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
199. Udorthents, ash										
200A:										
Charlevoix	3W	Slight	Severe	Slight	Moderate	Severe	Balsam fir	---	---	Norway spruce, eastern white pine, white spruce
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple*	65	43	
							Sugar maple	---	---	
							White spruce	---	---	
Ensley	3W	Slight	Severe	Severe	Severe	Severe	Balsam fir	60	114	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Red maple*	62	43	
							White spruce	---	---	
							Yellow birch	---	---	
201B:										
Sauxhead	3D	Slight	Severe	Moderate	Severe	Moderate	American basswood	---	---	Eastern white pine, white spruce
							Common hackberry	---	---	
							Eastern hemlock	---	---	
							Eastern hophornbeam	---	---	
							Quaking aspen	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
Jacobsville	2W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern arborvitae, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple*	55	29	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
202B:										
Sauxhead	3D	Slight	Severe	Moderate	Severe	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
203A:										
Au Gres	6W	Slight	Severe	Moderate	Severe	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Bigtooth aspen	---	---	
							Eastern arborvitae	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Jack pine	51	72	
							Paper birch	---	---	
							Quaking aspen*	70	86	
							Red maple	65	43	
							Yellow birch	---	---	
Deford	4W	Slight	Severe	Severe	Severe	Severe	Balsam fir	---	---	Eastern white pine, tamarack, white spruce
							Black ash	---	---	
							Eastern arborvitae	---	---	
							Quaking aspen*	60	57	
							Red maple	64	43	
							White spruce	---	---	
204B:										
Gogebic	3W	Slight	Severe	Moderate	Severe	Moderate	American basswood	66	57	Eastern white pine, white spruce
							Balsam fir	61	114	
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Sugar maple*	61	43	
							Yellow birch	62	43	
Tula	3W	Slight	Severe	Moderate	Moderate	Severe	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple*	65	43	
							Sugar maple	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
206B:										
Traunik	3L	Slight	Moderate	Slight	Slight	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Eastern hemlock	---	---	
							Eastern hophornbeam	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
207D:										
Dishno	3X	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							Yellow birch	---	---	
Michigamme	3X	Slight	Moderate	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
Rock outcrop.										
208F:										
Keewaydin	3R	Moderate	Severe	Slight	Slight	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Red maple	---	---	
							Sugar maple*	61	43	
							Yellow birch	---	---	

Table 8.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
208F:										
Michigamme	3R	Moderate	Severe	Slight	Moderate	Moderate	Balsam fir	---	---	Eastern white pine, white spruce
							Eastern hemlock	---	---	
							Eastern white pine	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	60	43	
							White spruce	---	---	
							Yellow birch	60	43	
209B:										
Garlic	3S	Slight	Moderate	Moderate	Slight	Moderate	Eastern hemlock	---	---	Eastern white pine, red pine
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	62	43	
							Yellow birch	---	---	
Fence	3L	Slight	Severe	Slight	Moderate	Moderate	American basswood	---	---	Eastern white pine, red pine, white spruce
							Balsam fir	---	---	
							Bigtooth aspen	---	---	
							Eastern hemlock	---	---	
							Paper birch	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Sugar maple*	65	43	
							Yellow birch	---	---	
M-W. Miscellaneous water										
W. Water										

Table 9.--Equipment Limitations on Woodland

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of other terms used in this table. Absence of an entry indicates that the soil was not evaluated)

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
10B: Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
10D: Grayling	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
10E: Grayling	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope	Moderate: slope.
11C: Deer Park	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
11D: Deer Park	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
12B: Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
12D: Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
12E: Rubicon	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
12F: Rubicon	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
13B: Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
13D: Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
13E--------------- Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
13F--------------- Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
14B--------------- Rousseau	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
14D--------------- Rousseau	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Moderate: slope.	Slight.
15A--------------- Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
16A--------------- Paquin	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
17A--------------- Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---------	Slight---------	Slight.
18---------------- Kinross	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
19---------------- Deford	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
20B:							
Rousseau---------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
Ocqueoc----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
20D:							
Rousseau	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Ocqueoc	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
20E:							
Rousseau	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Ocqueoc	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
22B Alcona	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
24B Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
24D Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
25B:							
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
25D:							
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
26A Skanee	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
27: Gay	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
28B: Keweenaw	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
28D: Keweenaw	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
28E: Keweenaw	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
29B: Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
29D: Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
31D: Trenary	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
32A: Charlevoix	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
33: Ensley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
34B: Onaway	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
34D: Onaway	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
34E: Onaway	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
35B: Champion	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
35D--------------- Champion	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony, slope.	Moderate: too stony.
36A--------------- Net	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
37---------------- Witbeck	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength, too bouldery.	Severe: low strength.	Moderate: low strength, too bouldery.
38B--------------- Pence	Slight---------	Slight---------	Slight---------	Year round-----	Slight---------	Slight---------	Slight.
38D--------------- Pence	Slight---------	Moderate: slope.	Slight---------	Year round-----	Slight---------	Moderate: slope.	Slight.
38E--------------- Pence	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round-----	Moderate: slope.	Severe: slope.	Moderate: slope.
39B--------------- Amasa	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
39D--------------- Amasa	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Moderate: slope.	Slight.
39E--------------- Amasa	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
40B--------------- Waiska	Slight---------	Slight---------	Slight---------	Year round-----	Slight---------	Slight---------	Slight.
40D--------------- Waiska	Slight---------	Moderate: slope.	Slight---------	Year round-----	Slight---------	Moderate: slope.	Slight.
41A--------------- Channing	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight---------	Slight---------	Slight.
42---------------- Minocqua	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
43B: Karlin	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
43D: Karlin	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
44B: Carlshend	Moderate: wetness, low strength.	Moderate: wetness, low strength.	Moderate: wetness, low strength.	Summer, winter	Slight	Moderate: depth to rock.	Moderate: depth to rock.
45A: Zeba	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
46: Jacobsville	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too stony.	Severe: low strength.	Moderate: low strength, too stony.
48: Burt	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
50A: Sundell	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
51: Nahma	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
52B: Summerville	Moderate: low strength.	Severe: depth to rock.	Severe: depth to rock.	Summer, fall, winter.	Slight	Severe: depth to rock.	Severe: depth to rock.
55F:							
Michigamme	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
56D:							
Peshekee	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.	Summer, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.
Rock outcrop.							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
56E:							
Peshekee	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.	Summer, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.
Rock outcrop.							
56F:							
Peshekee	Severe: rock outcrop, slope.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, slope, depth to rock.	Summer, fall, winter.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, slope, depth to rock.
Rock outcrop.							
57:							
Carbondale	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Tawas	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
58:							
Greenwood	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Dawson	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
59:							
Chippeny	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Nahma	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
60. Histosols and Aquents							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
61. Pits, borrow							
62B. Udorthents and Udipsamments							
64. Pits and Dumps							
65B. Udorthents-Urban land							
66B. Udipsamments-Urban land							
67B. Urban land-Rubicon							
68. Pits, quarries							
69B Escanaba	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
69D Escanaba	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
70B Nadeau	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
70D Nadeau	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
71B:							
Evart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
71B:							
Pelkie	Slight	Moderate: flooding.	Moderate: flooding.	Summer, winter	Slight	Slight	Slight.
Sturgeon	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
72B Emmet	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
72D Emmet	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
72E Emmet	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
73B Gogebic	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
73D Gogebic	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too cobbly, too stony.
74D:							
Schweitzer	Moderate: rock outcrop, slope, low strength, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony, low strength.	Summer, fall, winter.	Moderate: rock outcrop, slope, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony.
Michigamme	Moderate: rock outcrop, slope, low strength, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony, low strength.	Summer, fall, winter.	Moderate: rock outcrop, slope, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony.
Rock outcrop.							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
74F:							
Schweitzer	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Michigamme	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
76C:							
Garlic	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Alcona	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Voelker	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
76E:							
Garlic	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Alcona	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Voelker	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
76F:							
Garlic	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Alcona	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Voelker	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
77D:							
Garlic	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Alcona	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Voelker	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
77E:							
Garlic	Moderate: too sandy, slope.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Alcona	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Voelker	Moderate: too sandy, slope.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
78C:							
Keweenaw	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
78E:							
Keweenaw	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
78F:							
Keweenaw	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
79B:							
Keweenaw	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
80B:							
Sayner	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
80D:							
Sayner	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
80E:							
Sayner	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
Rubicon	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
81B Pelissier	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
81D Pelissier	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
81E Pelissier	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
84D:							
Rubicon	Moderate: rock outcrop, too sandy, slope.	Severe: slope.	Moderate: rock outcrop, slope, too sandy.	Spring, fall, winter.	Moderate: rock outcrop, slope.	Severe: slope.	Moderate: rock outcrop, slope.
Ishpeming	Moderate: rock outcrop, too sandy, slope.	Severe: slope.	Moderate: rock outcrop, slope, too sandy.	Spring, fall, winter.	Moderate: rock outcrop, slope.	Severe: slope.	Moderate: rock outcrop, slope.
Rock outcrop.							
84F:							
Rubicon	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Ishpeming	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
85A Solona	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
86B Mashek	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
87B Cunard	Moderate: low strength.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.	Summer, fall, winter.	Slight	Moderate: depth to rock.	Moderate: depth to rock.
88:							
Cathro	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Ensley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
89B:							
Emmet	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
89B:							
Solona-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight---------	Slight---------	Slight.
90B:							
Emmet------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
Escanaba---------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
90D:							
Emmet------------	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Moderate: slope.	Slight.
Escanaba---------	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Moderate: slope.	Slight.
91B:							
Onaway-----------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
Nadeau-----------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
92A:							
Ensley-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Solona-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight---------	Slight---------	Slight.
93:							
Tawas------------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Deford-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
94B:							
Keweenaw	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
94D:							
Keweenaw	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
94E:							
Keweenaw	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
95B Liminga	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
95D Liminga	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
100E:							
Sayner	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
Rubicon	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
100F:							
Sayner	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
Rubicon	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
103D:							
Rubicon	Moderate: rock outcrop, too sandy, slope.	Severe: slope.	Moderate: rock outcrop, slope, too sandy.	Spring, fall, winter.	Moderate: slope, rock outcrop.	Severe: slope.	Moderate: slope, rock outcrop.
Ocqueoc	Moderate: rock outcrop, too sandy, slope.	Severe: slope.	Moderate: rock outcrop, slope, too sandy.	Spring, fall, winter.	Moderate: slope, rock outcrop.	Severe: slope.	Moderate: slope, rock outcrop.
Rock outcrop.							
104C: Fence	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
105C: Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
106B:							
Sagola	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
106D:							
Sagola	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
107B:							
Goodman	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Sundog	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
107D:							
Goodman	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Sundog	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
107F:							
Goodman	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Sundog	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
108B:							
Goodman	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Sundog	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Wabeno	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
108D:							
Goodman	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Sundog	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Wabeno	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
109B:							
Rubicon	Moderate: too sandy, too bouldery.	Moderate: too sandy, too bouldery.	Moderate: too sandy, too bouldery.	Spring, fall, winter.	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
109B:							
Keweenaw	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.	Year round	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.
109D:							
Rubicon	Moderate: too sandy, too bouldery.	Moderate: slope, too sandy, too bouldery.	Moderate: too sandy, too bouldery.	Spring, fall, winter.	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
Keweenaw	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.	Year round	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
109F:							
Rubicon	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Keweenaw	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
110B:							
Nadeau	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Mancelona	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
110D:							
Nadeau	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Mancelona	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
111B: Grayling	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
112B:							
Keewaydin	Moderate: rock outcrop, slope, low strength, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, low strength, too bouldery.	Summer, fall, winter.	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
112B:							
Michigamme	Moderate: rock outcrop, slope, low strength, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, low strength, too bouldery.	Summer, fall, winter.	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.
Rock outcrop.							
112F:							
Keewaydin	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Michigamme	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
113B: Vanriper	Moderate: low strength, too bouldery.	Moderate: too bouldery, low strength.	Moderate: too bouldery, low strength.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.
113D: Vanriper	Moderate: low strength, too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery, low strength.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
113F: Vanriper	Severe: slope, too bouldery.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
114B: Vanriper	Moderate: low strength, too bouldery.	Moderate: too bouldery, low strength.	Moderate: too bouldery, low strength.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.
114D: Vanriper	Moderate: low strength, too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery, low strength.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
114F: Vanriper	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
117B: Fence	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, fall, winter.	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
118A:							
Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Deford	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
119B:							
Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
119D:							
Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
121B Onota	Moderate: low strength.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.	Summer, fall, winter.	Slight	Moderate: depth to rock.	Moderate: depth to rock.
122 Pleine	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too stony.	Severe: low strength.	Moderate: low strength, too stony.
123 Tula	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
124B:							
Gogebic	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
Dishno	Moderate: too stony, low strength.	Moderate: too stony, low strength.	Moderate: too stony, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
124D:							
Gogebic	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
Dishno	Moderate: low strength, too stony.	Moderate: low strength, too stony, slope.	Moderate: low strength, too stony.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
125D:							
Keweenaw	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.	Year round	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.
Kalkaska	Moderate: rock outcrop, too sandy, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, too sandy, slope, too bouldery.	Spring, fall, winter.	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.
Rock outcrop.							
125F:							
Keweenaw	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
126B Sundog	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
126D Sundog	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
126E Sundog	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
127B: Sundog	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
127D: Sundog	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
127F: Sundog	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
128B:							
Kalkaska	Severe: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Waiska	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
128D:							
Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Waiska	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
128E:							
Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Waiska	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
129C:							
Kalkaska	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
130A: Chabeneau	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
131:							
Witbeck	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too bouldery.	Severe: low strength.	Moderate: low strength, too bouldery.
Cathro	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
132. Slickens							
133B:							
Keewaydin	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Dishno	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
133D:							
Keewaydin	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Dishno	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
134B Keewaydin	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
134D Keewaydin	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
134F Keewaydin	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
135A:							
Witbeck	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: too bouldery, low strength.	Severe: low strength.	Moderate: too bouldery, low strength.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
135A:							
Net	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.
136A:							
Minocqua	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Channing	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
137D:							
Keewaydin	Moderate: low strength, too bouldery.	Moderate: slope, low strength, too bouldery.	Moderate: low strength, too bouldery.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
Sundog	Moderate: low strength, too bouldery.	Moderate: slope, low strength, too bouldery.	Moderate: low strength, too bouldery.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: too bouldery, slope.	Moderate: too bouldery.
137F:							
Keewaydin	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Sundog	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
138D:							
Sundog	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.	Summer, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.
Rock outcrop.							
138F:							
Sundog	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Summer, fall, winter.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.
Rock outcrop.							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
139B: Sundog	Moderate: low strength, too bouldery.	Moderate: low strength, too bouldery.	Moderate: low strength, too bouldery.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: too bouldery.	Moderate: too bouldery.
139D: Sundog	Moderate: low strength, too bouldery.	Moderate: slope, low strength, too bouldery.	Moderate: low strength, too bouldery.	Summer, fall, winter.	Moderate: too bouldery.	Moderate: slope, too bouldery.	Moderate: too bouldery.
140B:							
Champion	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
Dishno	Moderate: low strength, too stony.	Moderate: low strength, too stony.	Moderate: low strength, too stony.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
140D:							
Champion	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
Dishno	Moderate: low strength, too stony.	Moderate: low strength, slope, too stony.	Moderate: low strength, too stony.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
141D:							
Pelissier	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.	Year round	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.
Rock outcrop.							
142B: Pelissier	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
142D: Pelissier	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
144B: Farquar	Slight	Slight	Slight	Year round	Slight	Slight	Slight.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
145C:							
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
Yalmer	Severe: wetness.	Severe: wetness.	Severe: too sandy, wetness.	Summer, winter	Moderate: too stony.	Moderate: slope, too stony.	Moderate: too stony.
146B:							
Munising	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Skanee	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
147A:							
Skanee	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
Gay	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too stony.	Severe: low strength.	Moderate: low strength, too stony.
148B:							
Shoepac	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, winter	Slight	Slight	Slight.
Ensley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
149:							
Evart	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter	Slight	Slight	Slight.
Cathro	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
150: Shag	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
151A: Spear	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
153D:							
Ishpeming	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.	Spring, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop, slope.	Severe: rock outcrop.
Rock outcrop.							
153F:							
Ishpeming	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Spring, fall, winter.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.	Severe: rock outcrop, slope.
Rock outcrop.							
154B:							
Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Sayner	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
154D:							
Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Sayner	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
155A:							
Zeba	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
Jacobsville	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too stony.	Severe: low strength.	Moderate: low strength, too stony.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
156B------------- Duel	Moderate: too stony.	Moderate: depth to rock, too stony.	Moderate: depth to rock, too stony.	Year round-----	Moderate: too stony.	Moderate: depth to rock, too stony.	Moderate: depth to rock, too stony.
157B:							
Reade-----------	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength, depth to rock.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
Nahma-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
158C:							
Munising---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---------	Moderate: slope.	Slight.
Onota-----------	Moderate: low strength.	Moderate: slope, low strength.	Moderate: depth to rock,	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate:
Yalmer----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---------	Moderate: slope.	Slight.
159A------------- Jeske	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
160B:							
Paquin----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
Finch-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight---------	Slight---------	Slight.
161B------------- Yellowdog	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.	Year round-----	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
162B------------- Buckroe	Slight---------	Severe: depth to rock.	Severe: depth to rock.	Year round-----	Slight---------	Severe: depth to rock.	Severe: depth to rock.
165B:							
Chocolay---------	Moderate: low strength.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
165B:							
Waiska	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
166 Skandia	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
167:							
Skandia	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Jacobsville	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength, depth to rock.
168B:							
Yellowdog	Slight	Moderate: depth to rock.	Moderate: depth to rock.	Year round	Slight	Moderate: depth to rock.	Moderate: depth to rock.
Burt	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
170B Chocolay	Moderate: low strength, too stony.	Moderate: depth to rock, low strength, too stony.	Moderate: depth to rock, low strength, too stony.	Summer, fall, winter.	Moderate: too stony.	Moderate: depth to rock, too stony.	Moderate: depth to rock, too stony.
171B Paavola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
172D:							
Buckroe	Severe: rock outcrop.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, depth to rock.	Year round	Severe: rock outcrop.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, depth to rock.
Rock outcrop.							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
172F:							
Buckroe	Severe: rock outcrop, slope.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, depth to rock, slope.	Year round	Severe: rock outcrop, slope.	Severe: rock outcrop, slope, depth to rock.	Severe: rock outcrop, depth to rock, slope.
Rock outcrop.							
173B: Pence	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
173D: Pence	Slight	Moderate: slope.	Slight	Year round	Slight	Moderate: slope.	Slight.
174D:							
Yalmer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Moderate: slope.	Slight.
Rubicon	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
Urban land.							
175E:							
Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Waiska	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
175F:							
Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Waiska	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
176B:							
Greenwood	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
176B:							
Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
177E Frohling	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
177F Frohling	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
178D:							
Schweitzer	Moderate: rock outcrop, slope, low strength, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony, low strength.	Summer, fall, winter.	Moderate: rock outcrop, slope, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony.
Kalkaska	Moderate: rock outcrop, too sandy, slope, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too sandy, too stony.	Spring, fall, winter.	Moderate: rock outcrop, slope, too stony.	Severe: slope.	Moderate: rock outcrop, slope, too stony.
Rock outcrop.							
178F:							
Schweitzer	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.							
179E:							
Schweitzer	Moderate: slope, low strength, too stony.	Severe: slope.	Moderate: slope, too stony, low strength.	Summer, fall, winter.	Moderate: slope, too stony.	Severe: slope, too stony.	Moderate: slope, too stony.
Michigamme	Moderate: slope, low strength, too stony.	Severe: slope.	Moderate: slope, too stony, low strength.	Summer, fall, winter.	Moderate: slope, too stony.	Severe: slope.	Moderate: slope, too stony.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
180E:							
Kalkaska	Moderate: slope, too sandy.	Severe: slope.	Moderate: slope, too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Frohling	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
180F:							
Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Frohling	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
181E:							
Frohling	Moderate: slope, low strength, too stony.	Severe: slope.	Moderate: slope, low strength, too stony.	Summer, fall, winter.	Moderate: slope, too stony.	Severe: slope.	Moderate: slope, too stony.
Tokiahok	Moderate: slope, too stony.	Severe: slope.	Moderate: slope, too stony.	Year round	Moderate: slope, too stony.	Severe: slope.	Moderate: slope, too stony.
181F:							
Frohling	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Tokiahok	Severe: slope.	Severe: slope.	Severe: slope.	Year round	Severe: slope.	Severe: slope.	Severe: slope.
184C:							
Dishno	Moderate: low strength, too bouldery, rock outcrop.	Moderate: low strength, too bouldery, rock outcrop.	Moderate: low strength, too bouldery, rock outcrop.	Summer, winter	Moderate: rock outcrop, too bouldery.	Moderate: too bouldery, slope, rock outcrop.	Moderate: rock outcrop, too bouldery.
Witbeck	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: rock outcrop, low strength, too bouldery.	Severe: low strength.	Moderate: rock outcrop, low strength, too bouldery.
Rock outcrop.							

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
185B------------- Northland	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
187B------------- Reade	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength, depth to rock.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
190B:							
Emmet------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
Cunard-----------	Moderate: low strength.	Moderate: depth to rock, low strength.	Moderate: depth to rock, low strength.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
191B:							
Nahma------------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---------	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Sundell----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight---------	Slight---------	Slight.
193E:							
Frohling---------	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Tokiahok---------	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round-----	Moderate: slope.	Severe: slope.	Moderate: slope.
194E------------- Sporley	Severe: low strength.	Severe: low strength, slope.	Severe: low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
196E:							
Frohling---------	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
Onota------------	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: depth to rock, slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Log landings	Haul roads
196E:							
Tokiahok	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round	Moderate: slope.	Severe: slope.	Moderate: slope.
197B:							
Shoepac	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Trenary	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
198B:							
Shoepac	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
Reade	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength, depth to rock.	Summer, fall, winter.	Slight	Moderate: depth to rock.	Moderate: depth to rock.
199. Udorthents, ash							
200A:							
Charlevoix	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Slight	Slight	Slight.
Ensley	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
201B:							
Sauxhead	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Summer, winter	Moderate: too stony.	Severe: depth to rock.	Severe: depth to rock.
Jacobsville	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength, too stony.	Severe: low strength.	Moderate: low strength, too stony.
202B Sauxhead	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Summer, winter	Moderate: too stony.	Severe: depth to rock.	Severe: depth to rock.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
203A:							
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Slight	Slight	Slight.
Deford	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
204B:							
Gogebic	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
Tula	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter	Moderate: too stony.	Moderate: too stony.	Moderate: too stony.
206B Traunik	Slight	Slight	Slight	Year round	Slight	Slight	Slight.
207D:							
Dishno	Moderate: low strength, rock outcrop, too bouldery.	Moderate: low strength, slope, too bouldery.	Moderate: low strength, rock outcrop, too bouldery.	Summer, fall, winter.	Moderate: rock outcrop, too bouldery.	Moderate: too bouldery.	Moderate: rock outcrop, too bouldery.
Michigamme	Moderate: rock outcrop, slope, low strength, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery, low strength.	Summer, fall, winter.	Moderate: rock outcrop, slope, too bouldery.	Severe: slope.	Moderate: rock outcrop, slope, too bouldery.
Rock outcrop.							
208F:							
Keewaydin	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Michigamme	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.

Table 9.--Equipment Limitations on Woodland--Continued

Map symbol and soil name	Ratings for most limiting season(s): Logging areas and skid roads	Ratings for most limiting season(s): Log landings	Ratings for most limiting season(s): Haul roads	Preferred operating season(s)	Ratings for preferred operating season(s): Logging areas and skid roads	Ratings for preferred operating season(s): Log landings	Ratings for preferred operating season(s): Haul roads
209B:							
Garlic-----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight---------	Slight.
Fence------------	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, fall, winter.	Slight---------	Slight---------	Slight.
M-W. Miscellaneous water							
W. Water							

Table 10.--Forest Habitat Types

(See text for explanations of terms used in this table. An asterisk denotes the indicator species for the primary habitat type, and two asterisks denote the indicator species for the secondary habitat type. Percentages in the "Extent" column refer to the average coverage in areas where the species occurs)

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
10B, 10D, 10E-- Grayling	PVD	PVC	Hairgrass*	>25	Jack pine	1
			Sedges	15-25	Red pine	2
			Sweetfern	5-15	Northern red oak	3
			Low sweet blueberry	15-25	Quaking aspen	3
			Reindeer moss**	5-15	Red maple	3
			Blue cladonia**	5-15		
			Trailing arbutus	<5		
			Bracken fern	15-25		
			Canada blueberry	<5		
			Pin cherry	<5		
			Sand cherry	5-15		
			Bearberry	5-15		
			Juneberry	<5		
			Wild lily-of-the-valley	<5		
11C, 11D------- Deer Park	PVC	QAE	Sedges*	>25	Jack pine	1
			Low sweet blueberry	>25	Red pine	1
			Bracken fern	15-25	Eastern white pine	2
			Hairgrass	5-15	Paper birch	2
			Reindeer moss	5-15	Quaking aspen	3
			Trailing arbutus	5-15	Black cherry	3
			Wintergreen	5-15	Northern red oak	3
			Sweetfern	<5		
			Canada blueberry	<5		
			Cow wheat	<5		
			Sand cherry	<5		
			Juneberry	<5		
			Wild lily-of-the-valley	<5		
			Spinulose shield fern**	<5		
12B, 12D, 12E, 12F----------- Rubicon	AQVac	QAE	Low sweet blueberry*	5-15	Red maple	1
			Bracken fern	>25	Northern red oak	1
			Canada blueberry	5-15	Red pine	2
			Wintergreen	5-15	Jack pine	2
			Large-leaved aster	5-15	Quaking aspen	2
			Beaked hazelnut*	5-15	Eastern white pine	2
			Grasses	15-25	Balsam fir	2
			Pin cherry	<5	White spruce	3
			Wood anemone	<5		
			Juneberry	<5		
			Barren strawberry**	5-15		
			American starflower	<5		
			Cow wheat	<5		
			Wild sarsaparilla**	<5		
			Sweetfern	<5		
13B, 13D, 13E, 13F----------- Kalkaska	ATD-D	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Yellow birch	2
			Rosy twistedstalk	<5	Black cherry	2
			Hairy Solomon's seal	<5	Eastern hemlock	2
			Sedges	5-15	Paper birch	2
			Wild lily-of-the-valley	<5	American beech	2
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5	Red maple	3

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
14B, 14D------- Rousseau	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Red pine----------------	1
			Canada blueberry---------------	5-15	Jack pine---------------	2
			Wintergreen--------------------	5-15	Quaking aspen-----------	2
			Large-leaved aster-------------	5-15	Eastern white pine------	2
			Beaked hazelnut*---------------	5-15	Northern red oak--------	2
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
15A------------ Croswell	QAE	TMC-V	Bracken fern**-----------------	>25	Red maple---------------	1
			Wintergreen--------------------	5-15	Northern red oak--------	1
			Low sweet blueberry------------	15-25	Quaking aspen-----------	2
			Trailing arbutus*--------------	<5	Red pine----------------	2
			Juneberry----------------------	<5	Eastern white pine------	3
			Grasses------------------------	15-25	Jack pine---------------	3
			Canada blueberry---------------	5-15	White spruce------------	3
			Cow wheat----------------------	<5	Balsam fir--------------	3
			Sweetfern----------------------	5-15		
			Sedges-------------------------	<5		
			Blue cladonia------------------	<5		
			Wild lily-of-the-valley**------	<5		
16A------------ Paquin	ATD-D	TMC	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
17A------------ Au Gres	TMC	TMC-V	Goldthread*--------------------	5-15	Red maple---------------	1
			Wild lily-of-the-valley**------	5-15	Eastern hemlock---------	1
			Yellow beadlily----------------	<5	Red pine----------------	2
			Bunchberry*--------------------	5-15	Eastern white pine------	2
			American starflower------------	<5	Paper birch-------------	2
			Sedges-------------------------	5-15	White spruce------------	3
			Bracken fern-------------------	15-25	Balsam fir--------------	3
			Wild sarsaparilla--------------	<5	Quaking aspen-----------	3
			Shining clubmoss---------------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
18------------- Kinross	PCS	TMC-V	Sphagnum moss**----------------	>25	Black spruce------------	1
			Labrador tea-------------------	15-25	Tamarack----------------	1
			Leatherleaf*-------------------	15-25	Eastern white pine------	2
			Sedges-------------------------	>25		
			Canada blueberry---------------	5-15		
			Creeping snowberry-------------	<5		
			Small cranberry**--------------	5-15		
			Bog rosemary*------------------	5-15		
			Pale laurel*-------------------	5-15		
			Goldthread---------------------	<5		
			Pitcher plant**----------------	<5		
			Blueflag iris------------------	<5		
			Sundew**-----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
19------------ Deford	TMC	TTS	Goldthread*--------------------	5-15	Red maple---------------	1
			Wild lily-of-the-valley**------	5-15	Eastern hemlock---------	1
			Yellow beadlily----------------	<5	Red pine----------------	2
			Bunchberry*--------------------	5-15	Eastern white pine------	2
			American starflower------------	<5	Paper birch-------------	2
			Sedges-------------------------	5-15	White spruce------------	3
			Bracken fern-------------------	15-25	Balsam fir--------------	3
			Wild sarsaparilla--------------	<5	Quaking aspen-----------	3
			Shining clubmoss---------------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
20B, 20D, 20E-- Rousseau-Ocqueoc	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Red pine----------------	1
			Canada blueberry---------------	5-15	Jack pine---------------	2
			Wintergreen--------------------	5-15	Quaking aspen-----------	2
			Large-leaved aster-------------	5-15	Eastern white pine------	2
			Beaked hazelnut*---------------	5-15	Northern red oak--------	2
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
22B------------ Alcona	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
24B, 24D------- Munising	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
25B, 25D------- Munising-Yalmer	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
26A------------ Skanee	TMC-D	TMC	Wild lily-of-the-valley*-------	5-15	Eastern hemlock---------	1
			Goldthread**-------------------	5-15	Red maple---------------	1
			Yellow beadlily----------------	<5	Sugar maple-------------	2
			Bunchberry*--------------------	5-15	Yellow birch------------	2
			American starflower------------	<5	Balsam fir--------------	3
			Sedges-------------------------	5-15	White spruce------------	3
			Spinulose shield fern*---------	5-15		
			Wild sarsaparilla--------------	<5		
			Rosy twistedstalk--------------	<5		
			Shining clubmoss---------------	<5		
			American fly honeysuckle-------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
			Oak fern*----------------------	<5		
			Hairy Solomon's seal*----------	<5		
27------------- Gay	FI	TTS	Jewelweed*---------------------	5-15	Black ash---------------	1
			Lady fern----------------------	5-15	White ash---------------	1
			Elderberry---------------------	5-15	Red maple---------------	1
			Sedges-------------------------	15-25	Balsam poplar-----------	2
			Grasses------------------------	15-25	Balsam fir--------------	2
			Dwarf enchanter's nightshade*--	<5		
			Mints--------------------------	<5		
			Dewberry-----------------------	<5		
			Gooseberry---------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Raspberry----------------------	<5		
			Stinging nettle----------------	<5		
28B, 28D, 28E-- Keweenaw	ATD-D	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
29B, 29D------- Yalmer	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
31D------------ Trenary	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	3
			Hairy Solomon's seal-----------	<5	Eastern hemlock---------	3
			Rosy twistedstalk--------------	<5		
			Bedstraw-----------------------	<5		
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
32A------------ Charlevoix	AVO-CI	TMC-D	Sweet cicely**-----------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	Eastern hemlock---------	2
			Canadian, downy yellow violet**	<5	White ash---------------	2
			Hairy Solomon's seal-----------	<5	Balsam fir--------------	2
			Bedstraw-----------------------	<5	American basswood-------	3
			Lady fern----------------------	5-15	Ironwood----------------	3
			Red elderberry-----------------	<5	Yellow birch------------	3
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Dwarf enchanter's nightshade*--	<5		
			Jewelweed*---------------------	<5		
33------------- Ensley	FI	TTM	Jewelweed*---------------------	5-15	Black ash---------------	1
			Lady fern----------------------	5-15	White ash---------------	1
			Elderberry---------------------	5-15	Red maple---------------	1
			Sedges------------------------	15-25	Balsam poplar-----------	2
			Grasses-----------------------	15-25	Balsam fir--------------	2
			Dwarf enchanter's nightshade*--	<5		
			Mints--------------------------	<5		
			Dewberry-----------------------	<5		
			Gooseberry---------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Raspberry----------------------	<5		
			Stinging nettle----------------	<5		
34B, 34D, 34E-- Onaway	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	3
			Hairy Solomon's seal-----------	<5	Eastern hemlock---------	3
			Rosy twistedstalk--------------	<5		
			Bedstraw-----------------------	<5		
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
35B, 35D-------Champion	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
36A------------Net	TMC-D	---	Wild lily-of-the-valley*-------	5-15	Eastern hemlock---------	1
			Goldthread---------------------	5-15	Red maple---------------	1
			Yellow beadlily----------------	<5	Sugar maple-------------	2
			Bunchberry*--------------------	5-15	Yellow birch------------	2
			American starflower------------	<5	Balsam fir--------------	3
			Sedges-------------------------	5-15	White spruce------------	3
			Spinulose shield fern*---------	5-15		
			Wild sarsaparilla--------------	<5		
			Rosy twistedstalk--------------	<5		
			Shining clubmoss---------------	<5		
			American fly honeysuckle-------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
			Oak fern*----------------------	<5		
			Hairy Solomon's seal*----------	<5		
37-------------Witbeck	TTS	FI	Goldthread**-------------------	<5	Balsam fir--------------	1
			Bunchberry---------------------	<5	Northern whitecedar-----	1
			Wild lily-of-the-valley--------	5-15	Eastern hemlock---------	2
			American starflower------------	<5	Black spruce------------	2
			Sphagnum moss*-----------------	>25	Red maple---------------	3
			Canada blueberry---------------	<5		
			Wood sorrel**------------------	<5		
			Creeping snowberry-------------	<5		
			Dewberry-----------------------	<5		
			Tag alder----------------------	15-25		
			Yellow beadlily----------------	<5		
			Horsetail*---------------------	5-15		
			Sedges-------------------------	15-25		
38B, 38D, 38E--Pence	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Red pine----------------	1
			Canada blueberry---------------	5-15	Jack pine---------------	2
			Wintergreen--------------------	5-15	Quaking aspen-----------	2
			Large-leaved aster-------------	5-15	Eastern white pine------	2
			Beaked hazelnut*---------------	5-15	Northern red oak--------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
39B, 39D, 39E--Amasa	ATD	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	2
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
40B, 40D--Waiska	ATD	AVO	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	American basswood	2
			Wild lily-of-the-valley	<5	Black cherry	3
			Red elderberry**	<5	White spruce	3
			American starflower	<5	Balsam fir	3
			Canadian, downy yellow violet	<5		
41A--Channing	TMC-V	TMC	Goldthread**	5-15	Red maple	1
			Wild lily-of-the-valley**	5-15	Balsam fir	1
			Yellow beadlily	<5	White spruce	1
			Bunchberry**	5-15	Quaking aspen	2
			American starflower	<5	Eastern hemlock	2
			Sedges	5-15	Red pine	3
			Bracken fern	15-25	Eastern white pine	3
			Canada blueberry*	5-15	Paper birch	3
			Wild sarsaparilla	<5		
			Shining clubmoss	<5		
			Wintergreen	<5		
			Wood sorrel**	<5		
42--Minocqua	PCS	TTS	Sphagnum moss**	>25	Black spruce	1
			Labrador tea	15-25	Tamarack	1
			Leatherleaf*	15-25	Red maple	2
			Sedges	>25	Quaking aspen	2
			Canada blueberry	5-15	Balsam fir	2
			Creeping snowberry	<5	Eastern white pine	3
			Small cranberry**	5-15		
			Bog rosemary*	5-15		
			Pale laurel*	5-15		
			Goldthread	<5		
			Pitcher plant**	<5		
			Blueflag iris	<5		
			Sundew**	<5		
43B, 43D--Karlin	TM	AQVac	Wild lily-of-the-valley*	5-15	Quaking aspen	1
			Grasses	15-25	Red maple	1
			Sedges	5-15	Eastern hemlock	1
			Bracken fern	>25	Sugar maple	2
			American starflower	<5	Yellow birch	2
			Bedstraw	<5	White spruce	3
			Wild sarsaparilla	<5	Balsam fir	3
			Beaked hazelnut	15-25	Eastern white pine	3
			Ground pine	<5		
			Large-leaved aster	5-15		
			Juneberry	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
44B------------ Carlshend	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
45A------------ Zeba	TMC	TMC-V	Goldthread*--------------------	5-15	Red maple---------------	1
			Wild lily-of-the-valley**------	5-15	Eastern hemlock---------	1
			Yellow beadlily----------------	<5	Red pine----------------	2
			Bunchberry*--------------------	5-15	Eastern white pine------	2
			American starflower------------	<5	Paper birch-------------	2
			Sedges-------------------------	5-15	White spruce------------	3
			Bracken fern-------------------	15-25	Balsam fir--------------	3
			Wild sarsaparilla--------------	<5	Quaking aspen-----------	3
			Shining clubmoss---------------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
46------------- Jacobsville	TTS	FMC	Goldthread**-------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Eastern hemlock---------	1
			Wild lily-of-the-valley--------	5-15	Balsam fir--------------	2
			Sphagnum moss*-----------------	>25	Black spruce------------	2
			Wood sorrel**------------------	<5	Red maple---------------	3
			Dewberry-----------------------	<5		
			Tag alder----------------------	<15-25		
			Horsetail*---------------------	<15-25		
			Sedges-------------------------	15-25		
48------------- Burt	TTS	FMC	Goldthread**-------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Eastern hemlock---------	1
			Wild lily-of-the-valley--------	5-15	Balsam fir--------------	2
			Sphagnum moss*-----------------	<25	Black spruce------------	2
			Wood sorrel**------------------	<5	Red maple---------------	3
			Dewberry-----------------------	<5		
			Tag alder----------------------	<15-25		
			Horsetail*---------------------	<15-25		
			Sedges-------------------------	15-25		
50A------------ Sundell	TTP	TMC	Grasses/sedges-----------------	15-25	Northern whitecedar-----	1
			Dewberry-----------------------	5-15	Balsam fir--------------	1
			Large-leaved aster-------------	>25	Eastern hemlock---------	2
			Barren strawberry--------------	15-25	Red maple---------------	3
			Bunchberry---------------------	5-15	Quaking aspen-----------	3
			Horsetail----------------------	<5		
			Palmate-leaved sweet coltsfoot*	5-15		
			Wild sarsaparilla--------------	15-25		
			Bracken fern-------------------	5-15		
			Wild lily-of-the-valley--------	<5		
			Beaked hazelnut----------------	5-15		
			American fly honeysuckle-------	5-15		
			Tag alder----------------------	<5		
			Black snakeroot*---------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
51-------------	TTM	FI	Sedges------------------------	15-25	Northern whitecedar-----	1
Nahma			Wild lily-of-the-valley--------	<5	Balsam fir--------------	1
			American starflower------------	<5	Black ash---------------	2
			Naked miterwort*---------------	5-15	Eastern hemlock---------	2
			Twinflower*--------------------	<5	Red maple---------------	3
			Bedstraw-----------------------	<5	Quaking aspen-----------	3
			Dewberry-----------------------	5-15	Balsam poplar-----------	3
			Rattlesnake fern---------------	<5		
			Bunchberry---------------------	5-15		
			Sphagnum moss**----------------	>25		
			Pyrola-------------------------	<5		
			American fly honeysuckle-------	<5		
			Fringed polygala*--------------	<5		
			Goldthread---------------------	<5		
52B------------	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
Summerville			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	3
			Hairy Solomon's seal-----------	<5	Eastern hemlock---------	3
			Rosy twistedstalk--------------	<5		
			Bedstraw-----------------------	<5		
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
55F------------	ATD	TMV	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
Michigamme-			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
Rock outcrop			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
56D, 56E, 56F--	ATD	AQVac	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
Peshekee-Rock			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
outcrop			Rosy twistedstalk--------------	<5	Red maple---------------	2
			Hairy Solomon's seal-----------	<5	Northern red oak--------	2
			Sedges-------------------------	5-15	Eastern white pine------	3
			Wild lily-of-the-valley--------	<5		
			Red elderberry**---------------	<5		
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
57------------- Carbondale and Tawas	TTS	TTM	Goldthread**-------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Balsam fir--------------	1
			Wild lily-of-the-valley--------	5-15	Black spruce------------	2
			Meadowsweet--------------------	<5	Red maple---------------	2
			Sphagnum moss*-----------------	>25	Quaking aspen-----------	3
			Canada blueberry---------------	<5	Paper birch-------------	3
			Wood sorrel**------------------	<5	Balsam poplar-----------	3
			Creeping snowberry-------------	<5		
			Dewberry-----------------------	<5		
			Tag alder----------------------	15-25		
			Wild raisin--------------------	<5		
			Sweet gale---------------------	<5		
			Horsetail*---------------------	5-15		
			Sedges-------------------------	15-25		
			Willow sp.---------------------	<5		
58------------- Greenwood and Dawson	PCS	---	Sphagnum moss------------------	>25	Black spruce------------	1
			Labrador tea-------------------	15-25	Tamarack----------------	1
			Leatherleaf*-------------------	15-25	Eastern white pine------	2
			Sedges-------------------------	>25		
			Canada blueberry---------------	5-15		
			Creeping snowberry-------------	<5		
			Small cranberry----------------	5-15		
			Bog rosemary*------------------	5-15		
			Pale laurel*-------------------	5-15		
			Goldthread---------------------	<5		
			Pitcher plant*-----------------	<5		
			Blueflag iris------------------	<5		
			Sundew-------------------------	<5		
59-------------			Sphagnum moss*-----------------	>25	Northern whitecedar-----	1
Chippeny------	TTS	TTM	Sedges-------------------------	15-25	Black ash---------------	1
Nahma---------	TTM	FI	Tag alder----------------------	15-25	Balsam fir--------------	2
			Dewberry-----------------------	5-15	Red maple---------------	2
			American starflower------------	<5	Quaking aspen-----------	3
			Goldthread**-------------------	<5	Paper birch-------------	3
			Wood sorrel**------------------	<5	Balsam poplar-----------	3
			Bunchberry---------------------	5-15		
			Wild lily-of-the-valley--------	<5		
			Naked miterwort*---------------	5-15		
			Twinflower*--------------------	<5		
			Bedstraw-----------------------	<5		
60. Histosols and Aquents						
61. Pits, borrow						
62B. Udorthents and Udipsamments						
64. Pits and Dumps						
65B. Udorthents-Urban land						

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
66B. Udipsamments-Urban land						
67B. Urban land-Rubicon						
68. Pits, quarries						
69B, 69D------- Escanaba	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	3
			Hairy Solomon's seal-----------	<5	Eastern hemlock---------	3
			Rosy twistedstalk--------------	<5	Black cherry------------	3
			Bedstraw-----------------------	<5		
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
70B, 70D------- Nadeau	TM	AVO	Wild lily-of-the-valley*-------	5-15	Quaking aspen-----------	1
			Grasses------------------------	15-25	Red maple---------------	1
			Sedges------------------------	5-15	Eastern hemlock---------	1
			Bracken fern-------------------	>25	Sugar maple-------------	2
			American starflower------------	<5	Yellow birch------------	2
			Bedstraw-----------------------	<5	White spruce------------	3
			Wild sarsaparilla--------------	<5	Balsam fir--------------	3
			Beaked hazelnut----------------	15-25	Eastern white pine------	3
			Ground pine--------------------	<5		
			Large-leaved aster-------------	5-15		
			Juneberry----------------------	<5		
71B------------ Evart-Pelkie-Sturgeon	FMC	AVO-CI	Sedges*------------------------	>25	---	---
			Mints*-------------------------	15-25		
			Tag alder----------------------	>25		
			Sensitive fern-----------------	<5		
			Dewberry-----------------------	5-15		
			Jewelweed----------------------	<5		
			Bedstraw-----------------------	<5		
			Lady fern----------------------	<5		
			Grasses------------------------	15-25		
			Raspberry----------------------	5-15		
			Redosier dogwood---------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
72B, 72D, 72E--Emmet	AVO	AVO-A	Sweet cicely*	5-15	Sugar maple	1
			Sedges	5-15	American basswood	2
			Spinulose shield fern	5-15	Ironwood	2
			Canadian, downy yellow violet*	<5	Quaking aspen	2
			Hairy Solomon's seal	<5	Yellow birch	3
			Rosy twistedstalk	<5	Eastern hemlock	3
			Bedstraw	<5	Black cherry	3
			Lady fern	5-15		
			Red elderberry	<5		
			False Solomon's seal	<5		
			Jack in the pulpit**	<5		
			Trillium	<5		
			Rattlesnake fern**	<5		
			Blue cohosh**	<5		
			Bloodroot**	<5		
73B, 73D--Gogebic	ATD	AVO	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	American basswood	2
			Wild lily-of-the-valley	<5	Black cherry	3
			Elderberry**	<5	White spruce	3
			American starflower	<5	Balsam fir	3
			Canadian, downy yellow violet	<5		
74D, 74F--Schweitzer-Michigamme-Rock outcrop	ATD	AVO	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	American basswood	2
			Wild lily-of-the-valley	<5	Black cherry	3
			Red elderberry**	<5	White spruce	3
			American starflower	<5	Balsam fir	3
			Canadian, downy yellow violet	<5		
76C, 76E, 76F--Garlic-Alcona-Voelker	ATD-D	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Paper birch	3
			American starflower	<5	Balsam fir	3
77D, 77E--Garlic-Alcona-Voelker	ATD-D	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Paper birch	3
			American starflower	<5	Balsam fir	3
78C, 78E, 78F--Keweenaw-Kalkaska	ATD-D	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Paper birch	3
			American starflower	<5	Balsam fir	3

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
79B------------ Keweenaw-Munising	ATD-D	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Paper birch-------------	3
			American starflower------------	<5	Balsam fir--------------	3
80B, 80D, 80E-- Sayner-Rubicon	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Red pine----------------	1
			Canada blueberry---------------	5-15	Jack pine---------------	2
			Wintergreen--------------------	5-15	Quaking aspen-----------	2
			Large-leaved aster-------------	5-15	Eastern white pine------	2
			Beaked hazelnut*---------------	5-15	Northern red oak--------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
81B, 81D, 81E-- Pelissier	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Red pine----------------	1
			Canada blueberry---------------	5-15	Jack pine---------------	2
			Wintergreen--------------------	5-15	Quaking aspen-----------	2
			Large-leaved aster-------------	5-15	Eastern white pine------	2
			Beaked hazelnut*---------------	5-15	Northern red oak--------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
84D, 84F------- Rubicon-Ishpeming-Rock outcrop	AQVac	QAE	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
85A------------ Solona	AVO-CI	TMC-D	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	Eastern hemlock---------	2
			Canadian, downy yellow violet**	<5	White ash---------------	2
			Hairy Solomon's seal-----------	<5	Balsam fir--------------	2
			Bedstraw-----------------------	<5	American basswood-------	3
			Lady fern----------------------	5-15	Ironwood----------------	3
			Red elderberry-----------------	<5	Yellow birch------------	3
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Dwarf enchanter's nightshade*--	<5		
			Jewelweed*---------------------	<5		
86B------------ Mashek	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
87B------------ Cunard	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
88------------- Cathro-Ensley	TTM	FI	Sedges-------------------------	15-25	Northern whitecedar-----	1
			Wild lily-of-the-valley--------	<5	Balsam fir--------------	1
			American starflower------------	<5	Black ash---------------	2
			Naked miterwort*---------------	5-15	Eastern hemlock---------	2
			Twinflower*--------------------	<5	Red maple---------------	3
			Bedstraw-----------------------	<5	Quaking aspen-----------	3
			Dewberry-----------------------	5-15	Balsam poplar-----------	3
			Rattlesnake fern---------------	<5		
			Bunchberry---------------------	5-15		
			Sphagnum moss**----------------	>25		
			Pyrola-------------------------	<5		
			American fly honeysuckle-------	<5		
			Fringed polygala*--------------	<5		
			Goldthread---------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
89B:						
Emmet	AVO	TMC	Sweet cicely*	5-15	Sugar maple	1
			Spinulose shield fern	5-15	Red maple	1
			Canadian, downy yellow violet*	<5	Eastern hemlock	2
			Hairy Solomon's seal	<5	Yellow birch	2
			Rosy twistedstalk	<5	Balsam fir	3
			Jack in the pulpit**	<5		
			Blue cohosh**	<5		
Solona	AVO	TMC	Goldthread*	5-15	Sugar maple	1
			Bunchberry*	5-15	Red maple	1
			Wild lily-of-the-valley**	5-15	Eastern hemlock	2
			Bracken fern	15-25	Yellow birch	2
			Wood sorrel**	<5	Balsam fir	3
			Sedges	5-15		
			Wild sarsaparilla	<5		
90B, 90D: Emmet-Escanaba	AVO	AVO-A	Sweet cicely*	5-15	Sugar maple	1
			Sedges	5-15	American basswood	2
			Spinulose shield fern	5-15	Ironwood	2
			Canadian, downy yellow violet*	<5	Quaking aspen	2
			Hairy Solomon's seal	<5	Yellow birch	3
			Rosy twistedstalk	<5	Eastern hemlock	3
			Bedstraw	<5	Black cherry	3
			Lady fern	5-15		
			Red elderberry	<5		
			False Solomon's seal	<5		
			Jack in the pulpit**	<5		
			Trillium	<5		
			Rattlesnake fern**	<5		
			Blue cohosh**	<5		
			Bloodroot**	<5		
91B: Onaway-Nadeau	AVO	TM	Sweet cicely*	5-15	Sugar maple	1
			Spinulose shield fern	5-15	Red maple	1
			Canadian, downy yellow violet*	<5	Quaking aspen	1
			Hairy Solomon's seal	<5	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Jack in the pulpit**	<5	Balsam fir	3
			Blue cohosh**	<5		
			Wild lily-of-the-valley*	5-15		
			Bracken fern	>25		
			Grasses	5-15		
			Beaked hazelnut	15-25		
			Large-leaved aster	5-15		
			Wild sarsaparilla	<5		
			American starflower	<5		
92A: Ensley-Solona	FI	TMC	Jewelweed*	5-15	Black ash	1
			Lady fern	5-15	White ash	1
			Red elderberry	5-15	Red maple	1
			Sedges	15-25	Northern whitecedar	2
			Grasses	15-25	Balsam poplar	2
			Dwarf enchanter's nightshade*	<5	Balsam fir	2
			Mints	<5		
			Dewberry	<5		
			Gooseberry	<5		
			Wild lily-of-the-valley	<5		
			Raspberry	<5		
			Stinging nettle	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
93------------- Tawas-Deford	TTS	PO	Goldthread**------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Balsam fir--------------	1
			Wild lily-of-the-valley--------	5-15	Black spruce------------	2
			Meadowsweet--------------------	<5	Red maple---------------	2
			Sphagnum moss*-----------------	>25	Quaking aspen-----------	3
			Canada blueberry---------------	<5	Paper birch-------------	3
			Wood sorrel**------------------	<5	Balsam poplar-----------	3
			Creeping snowberry-------------	<5		
			Dewberry-----------------------	<5		
			Tag alder----------------------	15-25		
			Wild raisin--------------------	<5		
			Sweet gale---------------------	<5		
			Horsetail*---------------------	5-15		
			Sedges-------------------------	15-25		
			Willow sp.---------------------	<5		
94B, 94D, 94E-- Keweenaw-Kalkaska	ATD-D	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Paper birch-------------	3
			American starflower------------	<5	Balsam fir--------------	3
95B, 95D------- Liminga	ATD-D	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Paper birch-------------	3
			American starflower------------	<5	Balsam fir--------------	3
100E, 100F----- Sayner-Rubicon	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
103D----------- Rubicon-Ocqueoc-Rock outcrop	TMV	AQVac	Bracken fern-------------------	>25	Red maple---------------	1
			Wild lily-of-the-valley--------	5-15	Eastern hemlock---------	1
			Large-leaved aster-------------	>25	Sugar maple-------------	2
			Canada blueberry*--------------	<5	Eastern white pine------	2
			Wild sarsaparilla*-------------	5-15	Northern red oak--------	2
			Beaked hazelnut----------------	5-15	Balsam fir--------------	3
			Wintergreen--------------------	5-15	White spruce------------	3
			American starflower------------	5-15		
			Low sweet blueberry**----------	<5		
			Yellow beadlily**--------------	<5		
			False Solomon's seal**---------	<5		
			Rosy twistedstalk**------------	<5		
			Wood betony*-------------------	5-15		
			Spinulose shield fern**--------	<5		
			Sedges-------------------------	<5		
104C----------- Fence	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
105C----------- Munising	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
106B, 106D----- Sagola-Rubicon	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
107B, 107D, 107F----------Goodman-Sundog	ATD	TMV	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
108B, 108D-----Goodman-Sundog-Wabeno	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
109B, 109D, 109F----------Rubicon-Keweenaw	AQVac	QAE	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
110B, 110D-----Nadeau-Mancelona	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
111B----------- Grayling	PVD	PVC	Hairgrass*---------------------	>25	Jack pine---------------	1
			Sedges------------------------	15-25	Red pine----------------	2
			Sweetfern---------------------	5-15	Northern red oak--------	3
			Low sweet blueberry-----------	15-25	Quaking aspen-----------	3
			Reindeer moss**---------------	5-15	Red maple---------------	3
			Blue cladonia**---------------	5-15		
			Trailing arbutus--------------	<5		
			Bracken fern------------------	15-25		
			Canada blueberry--------------	<5		
			Pin cherry--------------------	<5		
			Sand cherry-------------------	5-15		
			Bearberry---------------------	5-15		
			Juneberry---------------------	<5		
			Wild lily-of-the-valley--------	<5		
112D, 112F----- Keewaydin- Michigamme- Rock outcrop	ATD	TMV	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**--------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
113B, 113D, 113F---------- Vanriper	ATD	AVO	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges------------------------	5-15	American basswood-------	2
			Wild lily-of-the-valley--------	<5	Black cherry------------	3
			Red elderberry**--------------	<5	White spruce------------	3
			American starflower------------	<5	Balsam fir--------------	3
			Canadian, downy yellow violet--	<5		
114B, 114D, 114F---------- Vanriper	ATD	AVO	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges------------------------	5-15	American basswood-------	2
			Wild lily-of-the-valley--------	<5	Black cherry------------	3
			Red elderberry**--------------	<5	White spruce------------	3
			American starflower------------	<5	Balsam fir--------------	3
			Canadian, downy yellow violet--	<5		
117B----------- Fence	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk-------------	<5	Eastern hemlock---------	3
			Bedstraw----------------------	<5	Black cherry------------	3
			Lady fern---------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
118A:						
Croswell------	TMC-V	QAE	Bracken fern**-----------------	>25	Red maple---------------	1
			Wintergreen--------------------	5-15	Northern red oak--------	1
			Low sweet blueberry------------	15-25	Red pine----------------	2
			Trailing arbutus*--------------	<5	Jack pine---------------	2
			Canada blueberry---------------	15-25	Quaking aspen-----------	2
			Wild lily-of-the-valley**------	<5	Eastern white pine------	3
			Sedges-------------------------	5-15	Balsam fir--------------	3
					White spruce------------	3
Deford--------	TMC-V	QAE	Goldthread*--------------------	5-15	Balsam fir--------------	1
			Bunchberry*--------------------	5-15	Northern whitecedar-----	1
			Wood sorrel*-------------------	<5	Eastern hemlock---------	1
					Black spruce------------	2
					Red maple---------------	3
119B, 119D----- Yalmer- Kalkaska	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
121B----------- Onota	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	2
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
122------------ Pleine	FI	TTM	Jewelweed*---------------------	5-15	Black ash---------------	1
			Lady fern----------------------	5-15	Red maple---------------	1
			Red elderberry-----------------	5-15	Northern whitecedar-----	1
			Sedges-------------------------	15-25	Balsam poplar-----------	2
			Grasses------------------------	15-25	Balsam fir--------------	2
			Dwarf enchanter's nightshade*--	<5		
			Mints--------------------------	<5		
			Dewberry-----------------------	<5		
			Gooseberry---------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Raspberry----------------------	<5		
			Stinging nettle----------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
123A----------- Tula	TMC-D	AVO-CI	Wild lily-of-the-valley*-------	5-15	Eastern hemlock---------	1
			Goldthread**-------------------	5-15	Red maple---------------	1
			Yellow beadlily----------------	<5	Sugar maple-------------	2
			Bunchberry*--------------------	5-15	Yellow birch------------	2
			American starflower------------	<5	Balsam fir--------------	3
			Sedges-------------------------	5-15	White spruce------------	3
			Spinulose shield fern*---------	5-15		
			Wild sarsaparilla--------------	<5		
			Rosy twistedstalk--------------	<5		
			Shining clubmoss---------------	<5		
			American fly honeysuckle-------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		
			Oak fern*----------------------	<5		
			Hairy Solomon's seal*----------	<5		
124B, 124D----- Gogebic-Dishno	ATD	AVO	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	American basswood-------	2
			Wild lily-of-the-valley--------	<5	Black cherry------------	3
			Red elderberry**---------------	<5	White spruce------------	3
			American starflower------------	<5	Balsam fir--------------	3
			Canadian, downy yellow violet--	<5		
125D, 125F----- Keweenaw-Kalkaska-Rock outcrop	ATD-D	TMV	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Paper birch-------------	3
			American starflower------------	<5	Balsam fir--------------	3
126B, 126D, 126E---------- Sundog	TMV	---	Bracken fern-------------------	>25	Red maple---------------	1
			Wild lily-of-the-valley--------	5-15	Eastern hemlock---------	1
			Large-leaved aster-------------	>25	Sugar maple-------------	2
			Canada blueberry*--------------	<5	Eastern white pine------	2
			Wild sarsaparilla*-------------	5-15	Northern red oak--------	2
			Beaked hazelnut----------------	5-15	Balsam fir--------------	3
			Wintergreen--------------------	5-15	White spruce------------	3
			American starflower------------	5-15		
			Low sweet blueberry------------	<5		
			Yellow beadlily----------------	<5		
			False Solomon's seal-----------	<5		
			Rosy twistedstalk--------------	<5		
			Wood betony*-------------------	5-15		
			Spinulose shield fern----------	<5		
			Sedges-------------------------	<5		
127B, 127D, 127F---------- Sundog	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
128B, 128D, 128E----------Kalkaska-Waiska	ATD-D	TM	Spinulose shield fern*----------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry**---------------	<5	Paper birch------------	3
			American starflower-----------	<5	Balsam fir-------------	3
129C----------Kalkaska-Munising	ATD	---	Spinulose shield fern*----------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry-----------------	<5	Balsam fir-------------	3
			American starflower-----------	<5		
			Canadian, downy yellow violet--	<5		
130A----------Chabeneau	TMC-V	TMV	Goldthread**-------------------	5-15	Red maple--------------	1
			Wild lily-of-the-valley**------	5-15	Balsam fir-------------	1
			Yellow beadlily----------------	<5	White spruce-----------	1
			Bunchberry**-------------------	5-15	Quaking aspen----------	2
			American starflower-----------	<5	Eastern hemlock---------	2
			Sedges------------------------	5-15	Red pine---------------	3
			Bracken fern------------------	15-25	Eastern white pine------	3
			Canada blueberry*--------------	5-15	Paper birch------------	3
			Wild sarsaparilla-------------	<5		
			Shining clubmoss---------------	<5		
			Wintergreen-------------------	<5		
			Wood sorrel**------------------	<5		
131-----------Witbeck-Cathro	TTS	FI	Sphagnum moss*-----------------	>25	Northern whitecedar-----	1
			Sedges------------------------	15-25	Black ash--------------	1
			Tag alder---------------------	15-25	Balsam fir-------------	2
			Dewberry----------------------	5-15	Red maple--------------	2
			American starflower-----------	<5	Quaking aspen----------	3
			Goldthread**-------------------	<5	Paper birch------------	3
			Wood sorrel**------------------	<5	Balsam poplar-----------	3
			Bunchberry--------------------	5-15		
			Wild lily-of-the-valley--------	<5		
			Naked miterwort*---------------	5-15		
			Twinflower*--------------------	<5		
			Bedstraw----------------------	<5		
132. Slickens						
133B, 133D-----Keewaydin-Dishno	ATD	TMV	Spinulose shield fern*----------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry**---------------	<5	Balsam fir-------------	3
			American starflower-----------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
134B, 134D, 134F: Keewaydin	ATD	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
135A: Witbeck-Net	TTS	TMC-D	Goldthread**	<5	Northern whitecedar	1
			Bunchberry	<5	Balsam fir	1
			Wild lily-of-the-valley	5-15	Black spruce	2
			Sphagnum moss*	>25	Red maple	2
			Canada blueberry	<5	Quaking aspen	3
			Wood sorrel**	<5	Paper birch	3
			Creeping snowberry	<5	Balsam poplar	3
			Dewberry	<5		
			Tag alder	15-25		
			Horsetail*	5-15		
			Sedges	15-25		
			Willow sp.	<5		
136A: Minocqua-Channing	TMC-V	PCS	Goldthread**	5-15	Red maple	1
			Wild lily-of-the-valley**	5-15	Balsam fir	1
			Yellow beadlily	<5	Black spruce	1
			Bunchberry**	5-15	Quaking aspen	2
			American starflower	<5	Eastern hemlock	2
			Sedges	5-15	Red pine	3
			Bracken fern	15-25	Eastern white pine	3
			Canada blueberry*	5-15	Paper birch	3
			Wild sarsaparilla	<5		
			Shining clubmoss	<5		
			Wintergreen	<5		
			Wood sorrel**	<5		
			Labrador tea	5-15		
			Sphagnum moss	5-15		
137D, 137F: Keewaydin-Sundog	ATD	TMV	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
138D, 138F: Sundog-Rock outcrop	TMV	---	Bracken fern	>25	Red maple	1
			Wild lily-of-the-valley	5-15	Eastern hemlock	1
			Large-leaved aster	>25	Sugar maple	2
			Canada blueberry*	<5	Eastern white pine	2
			Wild sarsaparilla*	5-15	Northern red oak	2
			Beaked hazelnut	5-15	Balsam fir	3
			Wintergreen	5-15	White spruce	3
			American starflower	5-15		
			Low sweet blueberry	<5		
			Yellow beadlily	<5		
			False Solomon's seal	<5		
			Rosy twistedstalk	<5		
			Wood betony*	5-15		
			Spinulose shield fern	<5		
			Sedges	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
139B, 139D-----Sundog	TMV	---	Bracken fern-------------------	>25	Red maple---------------	1
			Wild lily-of-the-valley--------	5-15	Eastern hemlock---------	1
			Large-leaved aster-------------	>25	Sugar maple-------------	2
			Canada blueberry*--------------	<5	Eastern white pine------	2
			Wild sarsaparilla*-------------	5-15	Northern red oak--------	2
			Beaked hazelnut----------------	5-15	Balsam fir--------------	3
			Wintergreen--------------------	5-15	White spruce------------	3
			American starflower------------	5-15		
			Low sweet blueberry------------	<5		
			Yellow beadlily----------------	<5		
			False Solomon's seal-----------	<5		
			Rosy twistedstalk--------------	<5		
			Wood betony*-------------------	5-15		
			Spinulose shield fern----------	<5		
			Sedges-------------------------	<5		
140B, 140D-----Champion-Dishno	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
141D-----------Pelissier-Rock outcrop	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
142B, 142D-----Pelissier	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
144B: Farquar	AQVac	TMC-V	Low sweet blueberry*	5-15	Red maple	1
			Bracken fern	>25	Northern red oak	1
			Canada blueberry	5-15	Red pine	2
			Wintergreen	5-15	Jack pine	2
			Large-leaved aster	5-15	Quaking aspen	2
			Beaked hazelnut*	5-15	Eastern white pine	3
			Grasses	15-25	Balsam fir	3
			Pin cherry	<5	White spruce	3
			Wood anemone	<5		
			Juneberry	<5		
			Barren strawberry**	5-15		
			American starflower	<5		
			Cow wheat	<5		
			Wild sarsaparilla**	<5		
			Sweetfern	<5		
145C: Munising-Yalmer	ATD	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
146B:						
Munising	ATD	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry*	<5	Balsam fir	3
			American starflower	<5		
Skanee	TMC-D	---	Goldthread*	5-15	Red maple	1
			Bunchberry*	5-15	Eastern hemlock	1
			Wild lily-of-the-valley	5-15	Sugar maple	2
			Wood sorrel*	<5	Yellow birch	2
					Balsam fir	2
147A:						
Skanee	TMC-D	---	Goldthread*	5-15	Red maple	1
			Bunchberry*	5-15	Eastern hemlock	1
			Wood sorrel*	<5	Sugar maple	2
			Oak fern	<5	Yellow birch	2
			Spinulose shield fern*	5-15	Balsam fir	2
Gay	FI	---	Jewelweed*	5-15	Black ash	1
			Dwarf enchanter's nightshade*	<5	Red maple	1
			Dewberry	<5	Northern whitecedar	2
			Stinging nettle	<5	Balsam fir	2
			Sedges	15-25	Balsam poplar	3
			Mints	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
148B:						
Shoepac-------	AVO	---	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Spinulose shield fern----------	5-15	American basswood-------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	2
			Jack in the pulpit-------------	<5	Ironwood----------------	3
			Blue cohosh--------------------	<5		
			Bloodroot----------------------	<5		
Ensley--------	FI	---	Jewelweed*---------------------	5-15	Black ash---------------	1
			Dwarf enchanter's nightshade*--	<5	Red maple---------------	1
			Dewberry-----------------------	<5	Northern whitecedar-----	2
			Stinging nettle----------------	<5	Balsam fir--------------	2
			Sedges-------------------------	15-25	Balsam poplar-----------	3
			Mints--------------------------	<5		
149------------ Evart-Cathro	FMC-C	FMC	Sedges*------------------------	>25	---	---
			Mints*-------------------------	15-25		
			Tag alder----------------------	>25		
			Sensitive fern-----------------	<5		
			Dewberry-----------------------	5-15		
			Redosier dogwood---------------	<5		
			Willow sp.---------------------	<5		
			Grasses------------------------	15-25		
			Purple meadowrue---------------	<5		
150------------ Shag	FI	FMC	Jewelweed*---------------------	5-15	Black ash---------------	1
			Lady fern----------------------	5-15	Red maple---------------	1
			Red elderberry-----------------	5-15	Northern whitecedar-----	1
			Sedges-------------------------	15-25	Balsam poplar-----------	2
			Grasses------------------------	15-25	Balsam fir--------------	2
			Dwarf enchanter's nightshade*--	<5		
			Mints--------------------------	<5		
			Dewberry-----------------------	<5		
			Gooseberry---------------------	<5		
			Wild lily-of-the-valley--------	<5		
			Raspberry----------------------	<5		
			Stinging nettle----------------	<5		
151A----------- Spear	TMC-D	TTP	Goldthread*--------------------	5-15	Red maple---------------	1
			Wild lily-of-the-valley**------	5-15	Balsam fir--------------	1
			Yellow beadlily----------------	<5	White spruce------------	1
			Bunchberry*--------------------	5-15	Quaking aspen-----------	2
			American starflower------------	<5	Eastern hemlock---------	2
			Sedges-------------------------	5-15	Red pine----------------	3
			Bracken fern-------------------	15-25	Eastern white pine------	3
			Wild sarsaparilla--------------	<5	Paper birch-------------	3
			Shining clubmoss---------------	<5		
			Wintergreen--------------------	<5		
			Wood sorrel*-------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
153D, 153F----- Ishpeming-Rock outcrop	AQVac	TMV	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
154B, 154D----- Rubicon-Sayner	AQVac	QAE	Low sweet blueberry*-----------	5-15	Red maple---------------	1
			Bracken fern-------------------	>25	Northern red oak--------	1
			Canada blueberry---------------	5-15	Red pine----------------	2
			Wintergreen--------------------	5-15	Jack pine---------------	2
			Large-leaved aster-------------	5-15	Quaking aspen-----------	2
			Beaked hazelnut*---------------	5-15	Eastern white pine------	3
			Grasses------------------------	15-25	Balsam fir--------------	3
			Pin cherry---------------------	<5	White spruce------------	3
			Wood anemone-------------------	<5		
			Juneberry----------------------	<5		
			Barren strawberry**------------	5-15		
			American starflower------------	<5		
			Cow wheat----------------------	<5		
			Wild sarsaparilla**------------	<5		
			Sweetfern----------------------	<5		
155A:						
Zeba----------	TMC	---	Goldthread---------------------	5-15	Red maple---------------	1
			Wild lily-of-the-valley--------	5-15	Balsam fir--------------	1
			Bunchberry---------------------	5-15	White spruce------------	2
			Sedges-------------------------	5-15	Quaking aspen-----------	2
			Bracken fern-------------------	15-25	Eastern hemlock---------	3
			Canada blueberry*--------------	5-15	Eastern white pine------	3
			Wood sorrel--------------------	<5	Paper birch-------------	3
Jacobsville---	TTS	---	Sphagnum moss*-----------------	>25	Northern whitecedar-----	1
			Tag alder----------------------	15-25	Balsam fir--------------	1
			Sedges-------------------------	15-25	Eastern hemlock---------	2
			Horsetail*---------------------	5-15	Black spruce------------	2
					Red maple---------------	3
156B----------- Duel	AVO-A	AVO	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Eastern hemlock---------	3
			Maidenhair fern*---------------	<5	Black cherry------------	3
			Wild leek*---------------------	<5		
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
157B:						
Reade	AVO	AVO-CI	Sweet cicely*	5-15	Sugar maple	1
			Spinulose shield fern	5-15	American basswood	2
			Canadian, downy yellow violet*	<5	Yellow birch	2
			Jack in the pulpit**	<5	Ironwood	3
			Blue cohosh**	<5		
			Bloodroot**	<5		
Nahma	FI	---	Jewelweed*	5-15	Black ash	1
			Dwarf enchanter's nightshade*	<5	Red maple	1
			Dewberry	<5	Balsam fir	2
			Stinging nettle	<5	Balsam poplar	2
			Sedges	5-15		
			Mints	<5		
158C: Munising-Onota-Yalmer	ATD	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
159A: Jeske	TMC	---	Goldthread*	5-15	Red maple	1
			Wild lily-of-the-valley	5-15	Eastern hemlock	1
			Yellow beadlily	<5	Red pine	2
			Bunchberry*	5-15	Eastern white pine	2
			American starflower	<5	Paper birch	2
			Sedges	5-15	White spruce	3
			Bracken fern	15-25	Balsam fir	3
			Wild sarsaparilla	<5	Quaking aspen	3
			Shining clubmoss	<5		
			Wintergreen	<5		
			Wood sorrel*	<5		
160B:						
Paquin	ATD-D	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Paper birch	3
			American starflower	<5	Balsam fir	3
Finch	TMC-D	---	Goldthread*	5-15	Eastern hemlock	1
			Bunchberry*	5-15	Red maple	1
			Wild lily-of-the-valley	5-15	Sugar maple	2
			Wood sorrel*	<5	Yellow birch	2
					Balsam fir	3
					White spruce	3
161B: Yellowdog	ATD	TM	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
162B----------- Buckroe	ATD	TMV	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
165B----------- Chocolay- Waiska	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
166------------ Skandia	TTS	PO	Goldthread**-------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Balsam fir--------------	1
			Wild lily-of-the-valley--------	5-15	Black spruce------------	2
			Sphagnum moss*-----------------	>25	Red maple---------------	2
			Canada blueberry---------------	<5	Quaking aspen-----------	3
			Wood sorrel**------------------	<5	Paper birch-------------	3
			Creeping snowberry-------------	<5	Balsam poplar-----------	3
			Dewberry-----------------------	<5		
			Tag alder----------------------	15-25		
			Horsetail*---------------------	5-15		
			Sedges-------------------------	15-25		
			Willow sp.---------------------	<5		
			Cinnamon fern*-----------------	15-25		
			Wild raisin--------------------	5-15		
			Marsh marigold**---------------	<5		
167------------ Skandia- Jacobsville	TTS	PO	Goldthread**-------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Balsam fir--------------	1
			Wild lily-of-the-valley--------	5-15	Black spruce------------	2
			Sphagnum moss*-----------------	>25	Red maple---------------	2
			Canada blueberry---------------	<5	Quaking aspen-----------	3
			Wood sorrel**------------------	<5	Paper birch-------------	3
			Creeping snowberry-------------	<5	Balsam poplar-----------	3
			Dewberry-----------------------	<5		
			Tag alder----------------------	15-25		
			Horsetail*---------------------	5-15		
			Sedges-------------------------	15-25		
			Willow sp.---------------------	<5		
			Cinnamon fern*-----------------	15-25		
			Wild raisin--------------------	5-15		
			Marsh marigold**---------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
168B:						
Yellowdog-----	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Red elderberry-----------------	<5	White spruce------------	3
					Balsam fir--------------	3
Burt----------	TTS	---	Goldthread---------------------	<5	Northern whitecedar-----	1
			Bunchberry---------------------	<5	Eastern hemlock---------	2
			Sphagnum moss*-----------------	>25	Balsam fir--------------	2
			Tag alder----------------------	15-25	Black spruce------------	3
			Wood sorrel--------------------	<5	Red maple---------------	3
			Sedges-------------------------	15-25		
			Dewberry-----------------------	<5		
170B----------- Chocolay	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
171B----------- Paavola	ATD	AVO	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
172D, 172F----- Buckroe-Rock outcrop	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
173B, 173D: Pence	AQVac	---	Low sweet blueberry*	5-15	Red maple	1
			Bracken fern	>25	Northern red oak	1
			Canada blueberry	5-15	Red pine	2
			Wintergreen	5-15	Jack pine	2
			Large-leaved aster	5-15	Quaking aspen	2
			Beaked hazelnut*	5-15	Bigtooth aspen	2
			Grasses	15-25	Eastern white pine	3
			Pin cherry	<5	Balsam fir	3
			Wood anemone	<5	White spruce	3
			Juneberry	<5		
			Barren strawberry**	5-15		
			American starflower	<5		
			Cow wheat	<5		
			Wild sarsaparilla**	<5		
			Sweetfern	<5		
174D: Yalmer-Rubicon-Urban land	ATD	TMV	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
175E, 175F: Kalkaska-Waiska	ATD-D	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Paper birch	3
			American starflower	<5	Balsam fir	3
176B:						
Greenwood	PCS	---	Sphagnum moss*	>25	Black spruce	1
			Labrador tea	15-25	Tamarack	1
			Leatherleaf*	15-25	Eastern white pine	2
			Sedges	>25		
			Canada blueberry	5-15		
			Small cranberry	5-15		
			Bog rosemary*	5-15		
			Pale laurel*	5-15		
			Pitcher plant	<5		
			Sundew	<5		
Croswell	TMC-V	---	Bracken fern	15-25	Red maple	1
			Wintergreen	<5	Eastern hemlock	1
			Canada blueberry	5-15	Paper birch	2
			Bunchberry*	5-15	Red pine	2
			Goldthread*	5-15	Balsam fir	3
					Eastern white pine	3
177E, 177F: Frohling	ATD	---	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
178D, 178F-----			Spinulose shield fern*---------	5-15	Sugar maple------------	1
Schweitzer----	ATD	---	Sugar maple seedlings----------	>25	Eastern hemlock---------	2
Kalkaska------	ATD-D	---	Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry-----------------	<5	Paper birch------------	3
			American starflower-----------	<5	Balsam fir-------------	3
Rock outcrop.						
179E-----------	ATD	AVO	Spinulose shield fern*---------	5-15	Sugar maple------------	1
Schweitzer-Michigamme			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry**---------------	<5	Balsam fir-------------	3
			American starflower-----------	<5		
			Canadian, downy yellow violet--	<5		
180E, 180F-----			Spinulose shield fern*---------	5-15	Sugar maple------------	1
Kalkaska------	ATD-D	---	Sugar maple seedlings----------	>25	Eastern hemlock---------	2
Frohling------	ATD	---	Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry-----------------	<5	Paper birch------------	3
			American starflower-----------	<5	Balsam fir-------------	3
181E, 181F-----	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple------------	1
Frohling-Tokiahok			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	Black cherry-----------	3
			Wild lily-of-the-valley--------	<5	White spruce-----------	3
			Red elderberry-----------------	<5	Balsam fir-------------	3
			American starflower-----------	<5		
			Canadian, downy yellow violet--	<5		
184C:						
Dishno--------	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk-------------	<5	Yellow birch-----------	2
			Hairy Solomon's seal-----------	<5	Red maple--------------	2
			Sedges------------------------	5-15	White spruce-----------	2
			Wild lily-of-the-valley--------	<5	Balsam fir-------------	3
			Red elderberry-----------------	<5		
			American starflower-----------	<5		
			Canadian, downy yellow violet--	<5		
Witbeck-------	TMC-D	FI	Goldthread*--------------------	5-15	Balsam fir-------------	1
			Bunchberry*--------------------	5-15	Northern whitecedar-----	1
			Wood sorrel*-------------------	<5	Black spruce-----------	2
			Oak fern**---------------------	<5	Eastern hemlock---------	2
			Spinulose shield fern*---------	5-15	Red maple--------------	3
Rock outcrop.						

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
185B----------- Northland	TM	---	Wild lily-of-the-valley*-------	5-15	Quaking aspen-----------	1
			Grasses------------------------	15-25	Red maple---------------	1
			Sedges-------------------------	5-15	Eastern hemlock---------	1
			Bracken fern-------------------	>25	Sugar maple-------------	2
			American starflower------------	<5	Yellow birch------------	2
			Bedstraw-----------------------	<5	Paper birch-------------	3
			Wild sarsaparilla--------------	<5	White spruce------------	3
			Beaked hazelnut----------------	15-25	Balsam fir--------------	3
			Ground pine--------------------	<5	Eastern white pine------	3
			Large-leaved aster-------------	5-15		
			Juneberry----------------------	<5		
187B----------- Reade	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
190B----------- Emmet-Cunard	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
191B:						
Nahma---------	FI	TTM	Jewelweed*---------------------	5-15	Black ash---------------	1
			Dwarf enchanter's nightshade*--	<5	Red maple---------------	1
			Dewberry-----------------------	<5	Balsam fir--------------	2
			Stinging nettle----------------	<5	Balsam poplar-----------	2
			Sedges-------------------------	5-15		
			Mints--------------------------	<5		
Sundell-------	AVO-CI	---	Jewelweed*---------------------	<5	Sugar maple-------------	1
			Dwarf enchanter's nightshade*--	<5	American basswood-------	2
			Blue cohosh--------------------	<5	Ironwood----------------	3
			Bloodroot----------------------	<5	Yellow birch------------	3
			Sweet cicely*------------------	5-15		
			Canadian, downy yellow violet*	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
193E----------- Frohling- Tokiahok	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
194E----------- Sporley	AVO	ATD	Sweet cicely*------------------	5-15	Sugar maple------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
196E----------- Frohling- Onota- Tokiahok	ATD	TM	Spinulose shield fern*---------	5-15	Sugar maple------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry**---------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
197B----------- Shoepac- Trenary	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple------------	1
			Sedges-------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
198B-----------Shoepac-Reade	AVO	AVO-A	Sweet cicely*------------------	5-15	Sugar maple-------------	1
			Sedges------------------------	5-15	American basswood-------	2
			Spinulose shield fern----------	5-15	Ironwood----------------	2
			Canadian, downy yellow violet*	<5	Quaking aspen-----------	2
			Hairy Solomon's seal-----------	<5	Yellow birch------------	3
			Rosy twistedstalk--------------	<5	Eastern hemlock---------	3
			Bedstraw-----------------------	<5	Black cherry------------	3
			Lady fern----------------------	5-15		
			Red elderberry-----------------	<5		
			False Solomon's seal-----------	<5		
			Jack in the pulpit**-----------	<5		
			Trillium-----------------------	<5		
			Rattlesnake fern**-------------	<5		
			Blue cohosh**------------------	<5		
			Bloodroot**--------------------	<5		
200A:						
Charlevoix----	TMC	---	Goldthread*--------------------	5-15	Red maple---------------	1
			Bunchberry*--------------------	5-15	Eastern hemlock---------	1
			Wood sorrel*-------------------	<5	Sugar maple-------------	2
			Oak fern-----------------------	<5	Yellow birch------------	2
			Wild lily-of-the-valley--------	5-15	Balsam fir--------------	3
Ensley--------	FI	---	Jewelweed*---------------------	5-15	Black ash---------------	1
			Dwarf enchanter's nightshade*--	5-15	Red maple---------------	1
			Dewberry*----------------------	<5	Northern whitecedar-----	2
			Stinging nettle----------------	<5	Balsam fir--------------	2
			Sedges-------------------------	<5	Balsam poplar-----------	3
			Mints--------------------------	15-25		
201B:						
Sauxhead------	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		
Jacobsville---	TTS	FI	Sphagnum moss*-----------------	>25	Eastern hemlock---------	1
			Sedges-------------------------	15-25	Northern whitecedar-----	1
			Tag alder----------------------	15-25	Balsam fir--------------	2
			Goldthread**-------------------	<5	Black spruce------------	2
			Bunchberry**-------------------	<5	Red maple---------------	3
			Dewberry-----------------------	<5		
202B-----------Sauxhead	ATD	---	Spinulose shield fern*---------	5-15	Sugar maple-------------	1
			Sugar maple seedlings----------	>25	Eastern hemlock---------	2
			Rosy twistedstalk--------------	<5	Yellow birch------------	2
			Hairy Solomon's seal-----------	<5	Red maple---------------	2
			Sedges-------------------------	5-15	Black cherry------------	3
			Wild lily-of-the-valley--------	<5	White spruce------------	3
			Red elderberry-----------------	<5	Balsam fir--------------	3
			American starflower------------	<5		
			Canadian, downy yellow violet--	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
203A:						
Au Gres	TMC	---	Goldthread*	5-15	Red maple	1
			Wild lily-of-the-valley	5-15	Eastern hemlock	1
			Bunchberry*	5-15	Red pine	2
			Sedges	5-15	Eastern white pine	2
			Bracken fern	15-25	Paper birch	2
			Wild sarsaparilla	<5	White spruce	3
			Shining clubmoss	<5	Balsam fir	3
			Wintergreen	<5	Quaking aspen	3
			Wood sorrel*	<5		
Deford	TTS	---	Sphagnum moss*	>25	Eastern hemlock	1
			Sedges	15-25	Northern whitecedar	1
			Tag alder	15-25	Balsam fir	2
			Goldthread	<5	Black spruce	2
			Bunchberry	<5	Red maple	3
			Wood sorrel	<5		
			Wild lily-of-the-valley	5-15		
204B:						
Gogebic	ATD	AVO	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
Tula	TMC	AVO-CI	Goldthread*	5-15	Eastern hemlock	1
			Bunchberry*	5-15	Red maple	1
			Wild lily-of-the-valley**	5-15	Northern whitecedar	2
			Wood sorrel*	<5	Yellow birch	3
			Bracken fern	15-25	Balsam fir	3
			Sedges	5-15		
206B: Traunik	AVO	---	Sweet cicely*	5-15	Sugar maple	1
			Sedges	5-15	American basswood	2
			Spinulose shield fern	5-15	Ironwood	2
			Canadian, downy yellow violet*	<5	Quaking aspen	2
			Hairy Solomon's seal	<5	Yellow birch	3
			Rosy twistedstalk	<5	Eastern hemlock	3
			Lady fern	5-15	Black cherry	3
			Red elderberry	<5		
			False Solomon's seal	<5		
			Jack in the pulpit	<5		
			Trillium	<5		
			Rattlesnake fern	<5		
			Blue cohosh	<5		
			Bloodroot	<5		
207D: Dishno-Michigamme-Rock outcrop	ATD	TMV	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		

Table 10.--Forest Habitat Types--Continued

Map symbol and soil name	Primary habitat type	Secondary habitat type	Common ground flora	Extent	Tree species	Dominance
				Pct		
208F: Keewaydin-Michigamme	ATD	TMV	Spinulose shield fern*	5-15	Sugar maple	1
			Sugar maple seedlings	>25	Eastern hemlock	2
			Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry**	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
209B:			Spinulose shield fern*	5-15	Sugar maple	1
Garlic	ATD-D	---	Sugar maple seedlings	>25	Eastern hemlock	2
Fence	ATD	---	Rosy twistedstalk	<5	Yellow birch	2
			Hairy Solomon's seal	<5	Red maple	2
			Sedges	5-15	Black cherry	3
			Wild lily-of-the-valley	<5	White spruce	3
			Red elderberry	<5	Balsam fir	3
			American starflower	<5		
			Canadian, downy yellow violet	<5		
M-W. Miscellaneous water						
W. Water						

Table 11.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
10B:					
Grayling	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Severe: droughty
10D:					
Grayling	Severe: too sandy too acid	Severe: too sandy too acid	Severe: slope too sandy too acid	Severe: too sandy	Severe: droughty
10E:					
Grayling	Severe: slope too sandy too acid	Severe: slope too sandy too acid	Severe: slope too sandy too acid	Severe: slope too sandy	Severe: slope droughty
11C:					
Deer Park	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Severe: droughty
11D:					
Deer Park	Severe: too sandy too acid	Severe: too sandy too acid	Severe: slope too sandy too acid	Severe: too sandy	Severe: droughty
12B:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
12D:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
12E:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
12F:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
13B:					
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
13D:					
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
13E:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
13F:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
14B:					
Rousseau	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
14D:					
Rousseau	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
15A:					
Croswell	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Moderate: too sandy droughty
16A:					
Paquin	Severe: cemented pan too sandy	Severe: cemented pan too sandy	Severe: cemented pan too sandy	Severe: too sandy	Severe: cemented pan
17A:					
Au Gres	Severe: too sandy wetness too acid	Severe: too sandy wetness too acid	Severe: too sandy wetness too acid	Severe: too sandy wetness	Severe: wetness
18:					
Kinross	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
19:					
Deford	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
20B:					
Rousseau	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
Ocqueoc	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
20D:					
Rousseau	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
Ocqueoc	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
20E:					
Rousseau	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Ocqueoc	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
22B:					
Alcona	Slight	Slight	Moderate: slope	Slight	Slight
24B:					
Munising	Severe: wetness	Moderate: percs slowly wetness	Severe: percs slowly wetness	Moderate: wetness	Moderate: wetness droughty
24D:					
Munising	Severe: wetness	Moderate: percs slowly slope wetness	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: slope wetness droughty
25B:					
Munising	Severe: wetness	Moderate: percs slowly wetness	Severe: percs slowly wetness	Moderate: wetness	Moderate: wetness droughty
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly too sandy	Severe: too sandy	Severe: droughty
25D:					
Munising	Severe: wetness	Moderate: percs slowly slope wetness	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: slope wetness droughty
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
26A:					
Skanee	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
27:					
Gay	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding
28B:					
Keweenaw	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
28D:					
Keweenaw	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
28E:					
Keweenaw	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
29B:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly too sandy	Severe: too sandy	Severe: droughty
29D:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
31D:					
Trenary	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope
32A:					
Charlevoix	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
33:					
Ensley	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
34B:					
Onaway	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
34D:					
Onaway	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope
34E:					
Onaway	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
35B:					
Champion	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones wetness	Moderate: large stones wetness	Severe: large stones
35D:					
Champion	Severe: percs slowly wetness	Severe: percs slowly slope	Severe: large stones slope wetness	Moderate: large stones wetness	Severe: large stones
36A:					
Net	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones percs slowly wetness	Severe: wetness	Severe: wetness

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
37:					
Witbeck	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
38B:					
Pence	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
38D:					
Pence	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope droughty
38E:					
Pence	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
39B:					
Amasa	Slight	Slight	Moderate: slope	Slight	Moderate: large stones
39D:					
Amasa	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope
39E:					
Amasa	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
40B:					
Waiska	Moderate: large stones	Moderate: large stones	Severe: large stones small stones	Slight	Severe: large stones droughty
40D:					
Waiska	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope small stones	Slight	Severe: large stones droughty
41A:					
Channing	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
42:					
Minocqua	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
43B:					
Karlin	Slight	Slight	Moderate: slope small stones	Slight	Moderate: droughty
43D:					
Karlin	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
44B:					
Carlshend	Severe: wetness depth to rock	Severe: too acid depth to rock	Severe: wetness depth to rock	Moderate: wetness	Severe: depth to rock
45A:					
Zeba	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
46:					
Jacobsville	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
48:					
Burt	Severe: too sandy ponding depth to rock	Severe: too sandy ponding depth to rock	Severe: too sandy ponding depth to rock	Severe: too sandy ponding	Severe: ponding depth to rock
50A:					
Sundell	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
51:					
Nahma	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
52B:					
Summerville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
55F:					
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
56D:					
Peshekee	Severe: depth to rock	Severe: depth to rock	Severe: large stones slope depth to rock	Moderate: large stones	Severe: large stones depth to rock
Rock outcrop	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Slight	Severe: depth to rock
56E:					
Peshekee	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: slope	Severe: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
56F:					
Peshekee	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: slope	Severe: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
57:					
Carbondale	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Tawas	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
58:					
Greenwood	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Dawson	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
59:					
Chippeny	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Nahma	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
60:					
Histosols	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Aquents	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
61. Pits, borrow					
62B: Udorthents.					
Udipsamments	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
64. Pits and Dumps					
65B. Udorthents-Urban land					

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
66B:					
Udipsamments	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
Urban land.					
67B:					
Urban land.					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: droughty
68:					
Pits, quarries	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
69B:					
Escanaba	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
69D:					
Escanaba	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Moderate: slope droughty
70B:					
Nadeau	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
70D:					
Nadeau	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope droughty
71B:					
Evart	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness
Pelkie	Severe: flooding	Slight	Moderate: flooding slope	Slight	Moderate: flooding droughty
Sturgeon	Severe: flooding wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
72B:					
Emmet	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
72D:					
Emmet	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
72E:					
Emmet	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
73B:					
Gogebic	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones wetness	Moderate: large stones wetness	Severe: large stones droughty
73D:					
Gogebic	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones slope wetness	Moderate: large stones wetness	Severe: large stones droughty
74D:					
Schweitzer	Severe: percs slowly slope	Severe: percs slowly slope	Severe: large stones percs slowly slope	Moderate: large stones slope	Severe: slope
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
Rock outcrop.					
74F:					
Schweitzer	Severe: percs slowly slope	Severe: percs slowly slope	Severe: large stones percs slowly slope	Severe: slope	Severe: slope
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Rock outcrop.					
76C:					
Garlic	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
Alcona	Slight	Slight	Severe: slope	Slight	Moderate: slope
Voelker	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
76E:					
Garlic	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Alcona	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Voelker	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
76F:					
Garlic	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Alcona	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Voelker	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
77D:					
Garlic	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
Alcona	Slight	Slight	Severe: slope	Slight	Moderate: slope
Voelker	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty
77E:					
Garlic	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Alcona	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Voelker	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
78C:					
Keweenaw	Slight	Slight	Severe: slope	Slight	Moderate: droughty
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: too sandy droughty
78E:					
Keweenaw	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
78F:					
Keweenaw	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
79B:					
Keweenaw	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Munising	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness droughty
80B:					
Sayner	Moderate: too sandy	Moderate: too sandy	Moderate: slope small stones too sandy	Moderate: too sandy	Severe: droughty
Rubicon	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
80D:					
Sayner	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Severe: droughty
Rubicon	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
80E:					
Sayner	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
81B:					
Pelissier	Slight	Slight	Severe: small stones	Slight	Severe: droughty
81D:					
Pelissier	Moderate: slope	Moderate: slope	Severe: slope	Slight	Severe: droughty
81E:					
Pelissier	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
84D:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Ishpeming	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Rock outcrop.					

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
84F:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Ishpeming	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Rock outcrop.					
85A:					
Solona	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: large stones wetness
86B:					
Mashek	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
87B:					
Cunard	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
88:					
Cathro	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Ensley	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
89B:					
Emmet	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
Solona	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: large stones wetness
90B:					
Emmet	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
Escanaba	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
90D:					
Emmet	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope
Escanaba	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Moderate: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
91B:					
Onaway	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
Nadeau	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
92A:					
Ensley	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Solona	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: large stones wetness
93:					
Tawas	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Deford	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
94B:					
Keweenaw	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
94D:					
Keweenaw	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
94E:					
Keweenaw	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
95B:					
Liminga	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
95D:					
Liminga	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
100E:					
Sayner	Severe: slope	Severe: slope	Severe: slope	Moderate: slope too sandy	Severe: slope droughty
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
100F:					
Sayner	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
103D:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Ocqueoc	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
104C:					
Fence	Slight	Slight	Severe: slope	Severe: erodes easily	Slight
105C:					
Munising	Severe: wetness	Moderate: percs slowly wetness	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: wetness droughty
106B:					
Sagola	Slight	Slight	Severe: large stones	Slight	Moderate: large stones droughty
Rubicon	Severe: too sandy	Severe: too sandy	Severe: large stones too sandy	Severe: too sandy	Moderate: too sandy droughty
106D:					
Sagola	Moderate: slope	Moderate: slope	Severe: large stones slope	Slight	Moderate: large stones slope droughty
Rubicon	Severe: too sandy	Severe: too sandy	Severe: large stones slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
107B:					
Goodman	Slight	Slight	Severe: large stones	Severe: erodes easily	Moderate: large stones
Sundog	Slight	Slight	Severe: large stones	Severe: erodes easily	Moderate: large stones droughty
107D:					
Goodman	Moderate: slope	Moderate: slope	Severe: large stones slope too acid	Severe: erodes easily	Moderate: large stones slope
Sundog	Moderate: slope	Moderate: slope	Severe: large stones slope	Severe: erodes easily	Moderate: large stones slope droughty
107F:					
Goodman	Severe: slope	Severe: slope	Severe: large stones slope	Severe: erodes easily slope	Severe: slope
Sundog	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: slope
108B:					
Goodman	Slight	Slight	Severe: large stones	Severe: erodes easily	Moderate: large stones
Sundog	Slight	Slight	Severe: large stones	Severe: erodes easily	Moderate: large stones droughty
Wabeno	Severe: wetness	Moderate: percs slowly wetness	Severe: large stones percs slowly wetness	Severe: erodes easily	Moderate: large stones
108D:					
Goodman	Moderate: slope	Moderate: slope	Severe: large stones slope	Severe: erodes easily	Moderate: large stones slope
Sundog	Moderate: slope	Moderate: slope	Severe: large stones slope	Severe: erodes easily	Moderate: large stones slope droughty
Wabeno	Severe: wetness	Moderate: percs slowly slope wetness	Severe: large stones slope wetness	Severe: erodes easily	Moderate: large stones slope wetness
109B:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: large stones too sandy	Severe: too sandy	Moderate: too sandy droughty
Keweenaw	Moderate: large stones	Moderate: large stones	Severe: large stones	Slight	Moderate: large stones droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
109D:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: large stones slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
Keweenaw	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope	Slight	Moderate: large stones slope droughty
109F:					
Rubicon	Severe: slope too sandy	Severe: slope too sandy	Severe: large stones slope too sandy	Severe: slope too sandy	Severe: slope
Keweenaw	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: slope
110B:					
Nadeau	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
Mancelona	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
110D:					
Nadeau	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope droughty
Mancelona	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope droughty
111B:					
Grayling	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Severe: droughty
112D:					
Keewaydin	Severe: slope	Severe: slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
112F:					
Keewaydin	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
113B:					
Vanriper	Moderate: large stones	Moderate: large stones	Severe: large stones	Moderate: large stones	Severe: large stones
113D:					
Vanriper	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope	Moderate: large stones	Severe: large stones
113F:					
Vanriper	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
114B:					
Vanriper	Moderate: large stones	Moderate: large stones	Severe: large stones	Moderate: large stones	Severe: large stones
114D:					
Vanriper	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope	Moderate: large stones	Severe: large stones
114F:					
Vanriper	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
117B:					
Fence	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Severe: erodes easily	Slight
118A:					
Croswell	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Moderate: droughty
Deford	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
119B:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly too sandy	Severe: too sandy	Severe: droughty
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
119D:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
121B:					
Onota	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: large stones small stones
122:					
Pleine	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding
123A:					
Tula	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones percs slowly wetness	Severe: wetness	Severe: large stones wetness
124B:					
Gogebic	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones wetness	Moderate: large stones wetness	Severe: large stones droughty
Dishno	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones	Moderate: large stones	Severe: large stones
124D:					
Gogebic	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones slope wetness	Moderate: large stones wetness	Severe: large stones droughty
Dishno	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones slope	Moderate: large stones	Severe: large stones
125D:					
Keweenaw	Severe: slope	Severe: slope	Severe: large stones slope	Moderate: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: large stones slope too sandy	Severe: too sandy	Severe: slope droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
125F:					
Keweenaw	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: large stones slope too sandy	Severe: slope too sandy	Severe: slope droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
126B:					
Sundog	Slight	Slight	Moderate: slope small stones	Severe: erodes easily	Moderate: large stones droughty
126D:					
Sundog	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: large stones slope droughty
126E:					
Sundog	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
127B:					
Sundog	Slight	Slight	Severe: large stones	Severe: erodes easily	Moderate: large stones droughty
127D:					
Sundog	Moderate: slope	Moderate: slope	Severe: large stones slope	Severe: erodes easily	Moderate: large stones slope droughty
127F:					
Sundog	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: slope
128B:					
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
Waiska	Moderate: large stones	Moderate: large stones	Severe: large stones small stones	Slight	Severe: large stones droughty
128D:					
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
128D:					
Waiska	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope small stones	Slight	Severe: large stones droughty
128E:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Waiska	Severe: slope	Severe: slope	Severe: large stones slope small stones	Severe: slope	Severe: large stones droughty
129C:					
Kalkaska	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: too sandy droughty
Munising	Severe: wetness	Moderate: percs slowly wetness	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: wetness droughty
130A:					
Chabeneau	Slight	Slight	Moderate: small stones	Slight	Moderate: large stones droughty
131:					
Witbeck	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
Cathro	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
132. Slickens					
133B:					
Keewaydin	Slight	Slight	Severe: large stones	Moderate: large stones	Severe: large stones
Dishno	Moderate: wetness	Moderate: wetness	Severe: large stones	Moderate: large stones	Severe: large stones
133D:					
Keewaydin	Moderate: slope	Moderate: slope	Severe: large stones slope	Moderate: large stones	Severe: large stones
Dishno	Moderate: wetness	Moderate: wetness	Severe: large stones slope	Moderate: large stones	Severe: large stones

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
134B:					
Keewaydin	Slight	Slight	Severe: large stones	Moderate: large stones	Severe: large stones
134D:					
Keewaydin	Moderate: slope	Moderate: slope	Severe: large stones slope	Moderate: large stones	Severe: large stones
134F:					
Keewaydin	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
135A:					
Witbeck	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
Net	Severe: large stones percs slowly wetness	Severe: large stones wetness	Severe: large stones percs slowly wetness	Severe: wetness	Severe: large stones wetness
136A:					
Minocqua	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Channing	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
137D:					
Keewaydin	Moderate: slope	Moderate: slope	Severe: large stones	Moderate: large stones	Severe: large stones
Sundog	Moderate: slope	Moderate: slope	Severe: large stones	Severe: erodes easily	Severe: large stones
137F:					
Keewaydin	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Sundog	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
138D:					
Sundog	Severe: slope	Severe: slope	Severe: large stones slope	Severe: erodes easily	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
138F:					
Sundog	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
138F:					
Rock outcrop-----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
139B:					
Sundog-----------------	Moderate: large stones	Moderate: large stones	Severe: large stones	Severe: erodes easily	Moderate: large stones droughty
139D:					
Sundog-----------------	Moderate: large stones slope	Moderate: large stones slope	Severe: large stones slope	Severe: erodes easily	Moderate: large stones slope droughty
140B:					
Champion---------------	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones wetness	Moderate: large stones wetness	Severe: large stones
Dishno-----------------	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones	Moderate: large stones	Severe: large stones
140D:					
Champion---------------	Severe: percs slowly wetness	Severe: percs slowly	Severe: large stones slope wetness	Moderate: large stones	Severe: large stones
Dishno-----------------	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones slope wetness	Moderate: large stones	Severe: large stones
141D:					
Pelissier--------------	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope droughty
Rock outcrop-----------	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
142B:					
Pelissier--------------	Slight	Slight	Severe: small stones	Slight	Severe: droughty
142D:					
Pelissier--------------	Moderate: slope	Moderate: slope	Severe: slope	Slight	Severe: droughty
144B:					
Farquar----------------	Moderate: small stones wetness	Moderate: small stones wetness	Severe: small stones	Slight	Severe: droughty
145C:					
Munising---------------	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: large stones wetness

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
145C:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
146B:					
Munising	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly wetness	Moderate: wetness	Moderate: large stones wetness
Skanee	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
147A:					
Skanee	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones percs slowly wetness	Severe: wetness	Severe: wetness
Gay	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
148B:					
Shoepac	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Moderate: wetness	Moderate: large stones
Ensley	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
149:					
Evart	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness	Severe: wetness	Severe: flooding wetness
Cathro	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
150:					
Shag	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
151A:					
Spear	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
153D:					
Ishpeming	Severe: slope too sandy	Severe: slope too sandy	Severe: large stones slope too sandy	Severe: too sandy	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
153F:					
Ishpeming	Severe: slope too sandy	Severe: slope too sandy	Severe: large stones slope too sandy	Severe: slope too sandy	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
154B:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: too sandy droughty
Sayner	Moderate: too sandy	Moderate: too sandy	Moderate: slope small stones too sandy	Moderate: too sandy	Severe: droughty
154D:					
Rubicon	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
Sayner	Moderate: slope too sandy	Moderate: slope too sandy	Severe: slope	Moderate: too sandy	Severe: droughty
155A:					
Zeba	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Jacobsville	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
156B:					
Duel	Moderate: large stones too sandy	Moderate: large stones too sandy	Severe: large stones	Moderate: too sandy	Moderate: depth to rock droughty
157B:					
Reade	Moderate: wetness	Moderate: wetness	Moderate: large stones slope small stones	Moderate: wetness	Moderate: large stones depth to rock
Nahma	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
158C:					
Munising	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly slope wetness	Moderate: wetness	Moderate: large stones wetness
Onota	Moderate: small stones	Moderate: small stones	Severe: slope small stones	Slight	Moderate: large stones small stones

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
158C:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
159A:					
Jeske	Severe: too sandy wetness	Severe: too sandy wetness	Severe: too sandy wetness	Severe: too sandy wetness	Severe: wetness
160B:					
Paquin	Severe: cemented pan too sandy	Severe: cemented pan too sandy	Severe: cemented pan too sandy	Severe: too sandy	Severe: cemented pan
Finch	Severe: cemented pan too sandy wetness	Severe: too sandy wetness too acid	Severe: cemented pan too sandy wetness	Severe: too sandy wetness	Severe: wetness too acid droughty
161B:					
Yellowdog	Severe: small stones	Severe: too sandy	Severe: small stones too sandy	Severe: small stones too sandy	Severe: small stones droughty
162B:					
Buckroe	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones droughty
165B:					
Chocolay	Moderate: large stones small stones wetness	Moderate: large stones small stones wetness	Severe: large stones small stones	Severe: large stones	Severe: large stones
Waiska	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Severe: droughty
166:					
Skandia	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
167:					
Skandia	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Jacobsville	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
168B:					
Yellowdog	Severe: small stones	Severe: too sandy	Severe: small stones too sandy	Severe: small stones too sandy	Severe: small stones droughty
Burt	Severe: too sandy ponding depth to rock	Severe: too sandy ponding depth to rock	Severe: too sandy ponding depth to rock	Severe: too sandy ponding	Severe: ponding depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
170B:					
Chocolay	Moderate: large stones small stones wetness	Moderate: large stones small stones wetness	Severe: large stones small stones	Severe: large stones	Severe: large stones
171B:					
Paavola	Severe: percs slowly small stones wetness	Severe: percs slowly small stones	Severe: small stones wetness	Severe: small stones	Severe: small stones droughty
172D:					
Buckroe	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: small stones	Severe: slope small stones droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
172F:					
Buckroe	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
173B:					
Pence	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones droughty
173D:					
Pence	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: large stones slope droughty
174D:					
Yalmer	Severe: too sandy wetness	Severe: too sandy	Severe: percs slowly slope too sandy	Severe: too sandy	Severe: droughty
Rubicon	Severe: too sandy	Severe: too sandy	Severe: slope too sandy	Severe: too sandy	Moderate: slope too sandy droughty
Urban land.					
175E:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Waiska	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope droughty

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
175F:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Waiska	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope droughty
176B:					
Greenwood	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Croswell	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy too acid	Severe: too sandy	Moderate: too sandy droughty
177E:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Moderate: slope	Severe: slope
177F:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
178D:					
Schweitzer	Severe: percs slowly slope	Severe: percs slowly slope	Severe: large stones percs slowly slope	Moderate: large stones slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
178F:					
Schweitzer	Severe: percs slowly slope	Severe: percs slowly slope	Severe: large stones percs slowly slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
179E:					
Schweitzer	Severe: percs slowly slope	Severe: percs slowly slope	Severe: large stones percs slowly slope	Severe: slope	Severe: slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
179E:					
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
180E:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: too sandy	Severe: slope
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Moderate: slope	Severe: slope
180F:					
Kalkaska	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope too sandy	Severe: slope
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
181E:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Moderate: slope	Severe: slope
Tokiahok	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Moderate: slope too sandy	Severe: slope
181F:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
Tokiahok	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
184C:					
Dishno	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones	Moderate: large stones	Severe: large stones
Witbeck	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
Rock outcrop.					
185B:					
Northland	Slight	Slight	Moderate: slope small stones	Slight	Moderate: droughty
187B:					
Reade	Moderate: wetness	Moderate: wetness	Moderate: slope small stones wetness	Moderate: wetness	Moderate: large stones depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
190B:					
Emmet	Slight	Slight	Moderate: large stones slope small stones	Slight	Slight
Cunard	Slight	Slight	Moderate: large stones slope small stones	Slight	Moderate: large stones depth to rock droughty
191B:					
Nahma	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
Sundell	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
193E:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
Tokiahok	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Severe: slope	Severe: slope
194E:					
Sporley	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
196E:					
Frohling	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Moderate: slope	Severe: slope
Onota	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope
Tokiahok	Severe: percs slowly slope	Severe: percs slowly slope	Severe: percs slowly slope	Moderate: slope too sandy	Severe: slope
197B:					
Shoepac	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Moderate: wetness	Moderate: large stones
Trenary	Slight	Slight	Moderate: slope small stones	Slight	Moderate: large stones
198B:					
Shoepac	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Moderate: wetness	Moderate: large stones
Reade	Moderate: wetness	Moderate: wetness	Moderate: slope small stones wetness	Moderate: wetness	Moderate: large stones depth to rock

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
199. Udorthents, ash					
200A:					
Charlevoix	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
Ensley	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
201B:					
Sauxhead	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: large stones small stones depth to rock	Slight	Severe: small stones depth to rock
Jacobsville	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus large stones ponding	Severe: excess humus ponding	Severe: excess humus ponding
202B:					
Sauxhead	Severe: small stones depth to rock	Severe: small stones depth to rock	Severe: large stones small stones depth to rock	Slight	Severe: small stones depth to rock
203A:					
Au Gres	Severe: too sandy wetness too acid	Severe: too sandy wetness too acid	Severe: too sandy wetness too acid	Severe: too sandy wetness	Severe: wetness
Deford	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
204B:					
Gogebic	Severe: percs slowly wetness	Severe: percs slowly	Severe: large stones percs slowly wetness	Moderate: large stones wetness	Severe: large stones droughty
Tula	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: large stones percs slowly wetness	Severe: wetness	Severe: large stones wetness
206B:					
Traunik	Slight	Slight	Severe: small stones	Slight	Moderate: large stones small stones
207D:					
Dishno	Moderate: large stones wetness	Moderate: large stones wetness	Severe: large stones	Moderate: large stones	Severe: large stones
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope

Table 11.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
207D:					
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope	Severe: slope depth to rock
208F:					
Keewaydin	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
Michigamme	Severe: slope	Severe: slope	Severe: large stones slope	Severe: slope	Severe: large stones slope
209B:					
Garlic	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy	Moderate: droughty
Fence	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Severe: erodes easily	Slight
M-W. Miscellaneous water					
W. Water					

Table 12.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
10B:										
Grayling	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
10D:										
Grayling	Very poor	Very poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
10E:										
Grayling	Very poor	Very poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
11C:										
Deer Park	Very poor	Very poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
11D:										
Deer Park	Very poor	Very poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
12B:										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
12D:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
12E:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
12F:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
13B:										
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
13D:										
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
13E:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
13F:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
14B:										
Rousseau	Fair	Fair	Good	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
14D:										
Rousseau	Fair	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
15A:										
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
16A:										
Paquin	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
17A:										
Au Gres	Poor	Poor	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair
18:										
Kinross	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
19:										
Deford	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
20B:										
Rousseau	Fair	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
Ocqueoc	Fair	Fair	Fair	Fair	Fair	Poor	Very poor	Fair	Fair	Very poor
20D:										
Rousseau	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
Ocqueoc	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
20E:										
Rousseau	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ocqueoc	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
22B:										
Alcona	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
24B:										
Munising	Good	Good	Good	Good	Good	Poor	Poor	Good	Fair	Poor
24D:										
Munising	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Fair	Very poor
25B:										
Munising	Good	Good	Good	Good	Good	Poor	Poor	Good	Fair	Poor
Yalmer	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
25D:										
Munising	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Yalmer	Fair	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
26A:										
Skanee	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
27:										
Gay	Very poor	Poor	Fair	Fair	Fair	Good	Poor	Poor	Fair	Fair
28B:										
Keweenaw	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
28D:										
Keweenaw	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
28E:										
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
29B:										
Yalmer	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor
29D:										
Yalmer	Fair	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
31D:										
Trenary	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
32A:										
Charlevoix	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
33:										
Ensley	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
34B:										
Onaway	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
34D:										
Onaway	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
34E:										
Onaway	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
35B:										
Champion	Very poor	Poor	Good	Good	Good	Poor	Poor	Poor	Good	Poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
35D:										
Champion	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
36A:										
Net	Very poor	Very poor	Good	Good	Good	Fair	Fair	Poor	Fair	Fair
37:										
Witbeck	Very poor	Very poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
38B:										
Pence	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
38D:										
Pence	Poor	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
38E:										
Pence	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
39B:										
Amasa	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
39D:										
Amasa	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
39E:										
Amasa	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
40B:										
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
40D:										
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
41A:										
Channing	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair
42:										
Minocqua	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
43B:										
Karlin	Fair	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
43D:										
Karlin	Fair	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
44B:										
Carlshend	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
	Potential for habitat elements							Potential as habitat for--		
45A:										
Zeba	Very poor	Poor	Good	Good	Good	Fair	Fair	Poor	Good	Fair
46:										
Jacobsville	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
48:										
Burt	Very poor	Poor	Poor	Poor	Poor	Good	Poor	Very poor	Poor	Fair
50A:										
Sundell	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
51:										
Nahma	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
52B:										
Summerville	Poor	Poor	Fair	Good	Good	Poor	Very poor	Poor	Fair	Poor
55F:										
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
56D:										
Peshekee	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
56E:										
Peshekee	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
56F:										
Peshekee	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
57:										
Carbondale	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Tawas	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
58:										
Greenwood	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Dawson	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
59:										
Chippeny	Very poor	Poor	Poor	Poor	Poor	Good	Fair	Very poor	Poor	Fair
Nahma	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
60:										
Histosols	Very poor	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
Aquents	Very poor	Very poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
61. Pits, borrow										
62B:										
Udorthents	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
Udipsamments	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Poor	Poor	Very poor
64. Pits and Dumps										
65B. Udorthents-Urban land										
66B. Udipsamments-Urban land										
67B: Urban land.										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
68:										
Pits, quarries	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
69B:										
Escanaba	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
69D:										
Escanaba	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
70B:										
Nadeau	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
70D:										
Nadeau	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
71B:										
Evart	Very poor	Very poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Pelkie	Poor	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor
Sturgeon	Fair	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
72B:										
Emmet	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
72D:										
Emmet	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
72E:										
Emmet	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
73B:										
Gogebic	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
73D:										
Gogebic	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
74D:										
Schweitzer	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Michigamme	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Rock outcrop.										
74F:										
Schweitzer	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
76C:										
Garlic	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Alcona	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Voelker	Poor	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
76E:										
Garlic	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Alcona	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Voelker	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
76F:										
Garlic	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Alcona	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Voelker	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
77D:										
Garlic	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Alcona	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Voelker	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
77E:										
Garlic	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Alcona	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Voelker	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
78C:										
Keweenaw	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
78E:										
Keweenaw	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
78F:										
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
79B:										
Keweenaw	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Munising	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
80B:										
Sayner	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rubicon	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
80D:										
Sayner	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
80E:										
Sayner	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
81B:										
Pelissier	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
81D:										
Pelissier	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
81E:										
Pelissier	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
84D:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ishpeming	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
84F:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ishpeming	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
85A:										
Solona	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
86B:										
Mashek	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
87B:										
Cunard	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
88:										
Cathro	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Ensley	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
89B:										
Emmet	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Solona	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
90B:										
Emmet	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Escanaba	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
90D:										
Emmet	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Escanaba	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
91B:										
Onaway	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Nadeau	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
92A:										
Ensley	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
Solona	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
93:										
Tawas	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Deford	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
94B:										
Keweenaw	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
94D:										
Keweenaw	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
94E:										
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
95B:										
Liminga	Fair	Fair	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor
95D:										
Liminga	Fair	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
100E:										
Sayner	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
100F:										
Sayner	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
103D:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Ocqueoc	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
104C:										
Fence	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
105C:										
Munising	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
106B:										
Sagola	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Open-land wild-life	Wood-land wild-life	Wetland wild-life
106D:										
Sagola	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
107B:										
Goodman	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Sundog	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
107D:										
Goodman	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Sundog	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
107F:										
Goodman	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
108B:										
Goodman	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Sundog	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Wabeno	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
108D:										
Goodman	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Sundog	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Wabeno	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
109B:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Keweenaw	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor
109D:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
109F:										
Rubicon	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
110B:										
Nadeau	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Mancelona	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
110D:										
Nadeau	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Mancelona	Fair	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
111B:										
Grayling	Poor	Poor	Fair	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor
112D:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
112F:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
113B:										
Vanriper	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor
113D:										
Vanriper	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
113F:										
Vanriper	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
114B:										
Vanriper	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
114D:										
Vanriper	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
114F:										
Vanriper	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
117B:										
Fence	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
118A:										
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
Deford	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
119B:										
Yalmer	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
119D:										
Yalmer	Fair	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
121B:										
Onota	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
122:										
Pleine	Very poor	Very poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
123A:										
Tula	Very poor	Very poor	Good	Good	Good	Fair	Poor	Poor	Fair	Poor
124B:										
Gogebic	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
Dishno	Very poor	Poor	Good	Good	Good	Poor	Poor	Poor	Good	Poor
124D:										
Gogebic	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Dishno	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
125D:										
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
125F:										
Keweenaw	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
126B:										
Sundog	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
126D:										
Sundog	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
126E:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
127B:										
Sundog	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
127D:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
127F:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
128B:										
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
128D:										
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
128E:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
128E:										
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
129C:										
Kalkaska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Munising	Fair	Good	Good	Fair	Fair	Very poor	Very poor	Good	Fair	Very poor
130A:										
Chabeneau	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
131:										
Witbeck	Very poor	Very poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
Cathro	Very poor	Very poor	Poor	Poor	Poor	Good	Fair	Very poor	Poor	Fair
132.										
Slickens										
133B:										
Keewaydin	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
Dishno	Poor	Poor	Good	Good	Good	Poor	Poor	Fair	Good	Poor
133D:										
Keewaydin	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Dishno	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
134B:										
Keewaydin	Poor	Poor	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
134D:										
Keewaydin	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
134F:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
135A:										
Witbeck	Very poor	Very poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
Net	Very poor	Very poor	Good	Good	Good	Fair	Fair	Poor	Fair	Fair
136A:										
Minocqua	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
Channing	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
137D:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
137F:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
138D:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
138F:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
139B:										
Sundog	Very poor	Very poor	Good	Good	Good	Poor	Very poor	Poor	Fair	Very poor
139D:										
Sundog	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
140B:										
Champion	Very poor	Poor	Good	Good	Good	Poor	Poor	Poor	Good	Poor
Dishno	Very poor	Poor	Good	Good	Good	Poor	Poor	Poor	Good	Poor
140D:										
Champion	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Dishno	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
141D:										
Pelissier	Very poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
142B:										
Pelissier	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
142D:										
Pelissier	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
144B:										
Farquar	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
145C:										
Munising	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Yalmer	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
146B:										
Munising	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Skanee	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
147A:										
Skanee	Very poor	Poor	Good	Good	Good	Fair	Fair	Poor	Good	Fair
Gay	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
148B:										
Shoepac	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Ensley	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
149:										
Evart	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Cathro	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
150:										
Shag	Very poor	Poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
151A:										
Spear	Fair	Good	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair
153D:										
Ishpeming	Very poor	Very poor	Fair	Fair	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
153F:										
Ishpeming	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
154B:										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Sayner	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
154D:										
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Sayner	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
155A:										
Zeba	Very poor	Poor	Good	Good	Good	Fair	Fair	Poor	Good	Fair
Jacobsville	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
156B:										
Duel	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
157B:										
Reade	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
Nahma	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
158C:										
Munising	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Onota	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Yalmer	Poor	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
159A:										
Jeske	Very poor	Very poor	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Poor
160B:										
Paquin	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
Finch	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair
161B:										
Yellowdog	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
162B:										
Buckroe	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
165B:										
Chocolay	Very poor	Very poor	Fair	Good	Good	Poor	Poor	Poor	Fair	Poor
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
166:										
Skandia	Very poor	Very poor	Poor	Poor	Poor	Good	Fair	Very poor	Poor	Fair

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
167:										
Skandia	Very poor	Very poor	Poor	Poor	Poor	Good	Fair	Very poor	Poor	Fair
Jacobsville	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
168B:										
Yellowdog	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
Burt	Very poor	Very poor	Poor	Poor	Poor	Good	Poor	Very poor	Poor	Fair
170B:										
Chocolay	Very poor	Very poor	Fair	Good	Good	Poor	Poor	Poor	Fair	Poor
171B:										
Paavola	Poor	Poor	Fair	Good	Good	Poor	Poor	Poor	Fair	Poor
172D:										
Buckroe	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
Rock outcrop.										
172F:										
Buckroe	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
Rock outcrop.										
173B:										
Pence	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
173D:										
Pence	Very poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
174D:										
Yalmer	Fair	Fair	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Urban land.										
175E:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
175F:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
175F:										
Waiska	Poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
176B:										
Greenwood	Very poor	Very poor	Poor	Poor	Poor	Good	Good	Very poor	Poor	Good
Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor
177E:										
Frohling	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
177F:										
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
178D:										
Schweitzer	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Kalkaska	Very poor	Poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
178F:										
Schweitzer	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
179E:										
Schweitzer	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
180E:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Frohling	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
180F:										
Kalkaska	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
181E:										
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
181E:										
Tokiahok	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
181F:										
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Tokiahok	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
184C:										
Dishno	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Witbeck	Very poor	Very poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
Rock outcrop.										
185B:										
Northland	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
187B:										
Reade	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
190B:										
Emmet	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Cunard	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
191B:										
Nahma	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
Sundell	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
193E:										
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Tokiahok	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
194E:										
Sporley	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
196E:										
Frohling	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Onota	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Tokiahok	Very poor	Very poor	Fair	Good	Good	Very poor	Very poor	Poor	Fair	Very poor

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
197B:										
Shoepac	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Poor
Trenary	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
198B:										
Shoepac	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Poor
Reade	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor
199. Udorthents, ash										
200A:										
Charlevoix	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Ensley	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
201B:										
Sauxhead	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
Jacobsville	Very poor	Poor	Fair	Fair	Fair	Good	Fair	Poor	Fair	Fair
202B:										
Sauxhead	Very poor	Very poor	Poor	Fair	Fair	Very poor	Very poor	Very poor	Poor	Very poor
203A:										
Au Gres	Poor	Poor	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair
Deford	Very poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
204B:										
Gogebic	Very poor	Poor	Good	Good	Good	Poor	Very poor	Poor	Good	Very poor
Tula	Very poor	Very poor	Good	Good	Good	Fair	Fair	Poor	Fair	Fair
206B:										
Traunik	Poor	Poor	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
207D:										
Dishno	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										

Table 12.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life
208F:										
Keewaydin	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
Michigamme	Very poor	Very poor	Good	Good	Good	Very poor	Very poor	Poor	Fair	Very poor
209B:										
Garlic	Poor	Poor	Fair	Good	Good	Poor	Poor	Poor	Fair	Very poor
Fence	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Poor
M-W. Miscellaneous water										
W. Water										

Table 13.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10B:						
Grayling	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
10D:						
Grayling	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
10E:						
Grayling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
11C:						
Deer Park	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
11D:						
Deer Park	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
12B:						
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
12D:						
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
12E:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
12F:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
13B:						
Kalkaska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
13D:						
Kalkaska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
13E:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
13F:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
14B:						
Rousseau	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
14D:						
Rousseau	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
15A:						
Croswell	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Moderate: too sandy droughty
16A:						
Paquin	Severe: cemented pan wetness cutbanks cave	Moderate: cemented pan wetness	Severe: cemented pan wetness	Moderate: cemented pan wetness	Moderate: cemented pan wetness	Severe: cemented pan
17A:						
Au Gres	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
18:						
Kinross	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: excess humus ponding
19:						
Deford	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: excess humus ponding
20B:						
Rousseau	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
Ocqueoc	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
20D:						
Rousseau	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Ocqueoc	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
20E:						
Rousseau	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ocqueoc	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
22B:						
Alcona	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Slight
24B:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: wetness droughty
24D:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Moderate: slope wetness droughty
25B:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: wetness droughty
Yalmer	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Severe: droughty
25D:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Moderate: slope wetness droughty
Yalmer	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: slope wetness	Severe: droughty
26A:						
Skanee	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
27:						
Gay	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
28B:						
Keweenaw	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
28D:						
Keweenaw	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
28E:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
29B:						
Yalmer	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Severe: droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
29D:						
Yalmer	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: slope wetness	Severe: droughty
31D:						
Trenary	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
32A:						
Charlevoix	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness
33:						
Ensley	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
34B:						
Onaway	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
34D:						
Onaway	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
34E:						
Onaway	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
35B:						
Champion	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Severe: large stones
35D:						
Champion	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Severe: large stones
36A:						
Net	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
37:						
Witbeck	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
38B:						
Pence	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: large stones droughty
38D:						
Pence	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: large stones slope droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
38E:						
Pence	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
39B:						
Amasa	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
39D:						
Amasa	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
39E:						
Amasa	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
40B:						
Waiska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: large stones droughty
40D:						
Waiska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: large stones droughty
41A:						
Channing	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
42:						
Minocqua	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
43B:						
Karlin	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
43D:						
Karlin	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
44B:						
Carlshend	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock
45A:						
Zeba	Severe: wetness cutbanks cave depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action wetness	Severe: wetness

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
46:						
Jacobsville	Severe: ponding cutbanks cave depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
48:						
Burt	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock
50A:						
Sundell	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action wetness	Severe: wetness
51:						
Nahma	Severe: ponding depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
52B:						
Summerville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock
55F:						
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
56D:						
Peshekee	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: large stones depth to rock
Rock outcrop	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock
56E:						
Peshekee	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
56F:						
Peshekee	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
57:						
Carbondale	Severe: excess humus ponding	Severe: low strength subsides ponding	Severe: low strength subsides ponding	Severe: low strength subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
Tawas	Severe: excess humus ponding cutbanks cave	Severe: low strength subsides ponding	Severe: subsides ponding	Severe: low strength subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
58:						
Greenwood	Severe: excess humus ponding	Severe: low strength ponding	Severe: low strength ponding	Severe: low strength ponding	Severe: excess humus ponding	Severe: excess humus ponding
Dawson	Severe: excess humus ponding cutbanks cave	Severe: low strength subsides ponding	Severe: subsides ponding	Severe: low strength subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
59:						
Chippeny	Severe: ponding cutbanks cave depth to rock	Severe: low strength subsides ponding	Severe: subsides ponding depth to rock	Severe: low strength subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
Nahma	Severe: ponding depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
60:						
Histosols	Severe: excess humus ponding	Severe: low strength ponding	Severe: ponding	Severe: low strength ponding	Severe: frost action ponding	Severe: excess humus ponding
Aquents	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
61. Pits, borrow						
62B:						
Udorthents.						
Udipsamments	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
64. Pits and Dumps						
65B. Udorthents-Urban land						
66B:						
Udipsamments	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
Urban land.						

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
67B:						
Urban land.						
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
68:						
Pits, quarries	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
69B:						
Escanaba	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: droughty
69D:						
Escanaba	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: slope droughty
70B:						
Nadeau	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action large stones	Moderate: large stones droughty
70D:						
Nadeau	Severe: cutbanks cave	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: frost action large stones slope	Moderate: large stones slope droughty
71B:						
Evart	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness
Pelkie	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding droughty
Sturgeon	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding frost action wetness	Severe: wetness
72B:						
Emmet	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
72D:						
Emmet	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
72E:						
Emmet	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
73B:						
Gogebic	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Severe: large stones droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
73D:						
Gogebic	Severe: wetness	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Severe: large stones droughty
74D:						
Schweitzer	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop.						
74F:						
Schweitzer	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop.						
76C:						
Garlic	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: slope droughty
Alcona	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: slope
Voelker	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
76E:						
Garlic	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Alcona	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Voelker	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
76F:						
Garlic	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Alcona	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76F:						
Voelker	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
77D:						
Garlic	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Alcona	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: slope
Voelker	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
77E:						
Garlic	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Alcona	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Voelker	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
78C:						
Keweenaw	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Kalkaska	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: too sandy droughty
78E:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
78F:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
79B:						
Keweenaw	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: wetness droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
80B:						
Sayner	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
80D:						
Sayner	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
80E:						
Sayner	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
81B:						
Pelissier	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
81D:						
Pelissier	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
81E:						
Pelissier	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
84D:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ishpeming	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						
84F:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ishpeming	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
Rock outcrop.						

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
85A:						
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: large stones wetness
86B:						
Mashek	Moderate: wetness dense layer	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: large stones
87B:						
Cunard	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: frost action depth to rock	Moderate: large stones
88:						
Cathro	Severe: excess humus ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
Ensley	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
89B:						
Emmet	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: large stones wetness
90B:						
Emmet	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
Escanaba	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: droughty
90D:						
Emmet	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
Escanaba	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: slope droughty
91B:						
Onaway	Slight	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
Nadeau	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action large stones	Moderate: large stones droughty
92A:						
Ensley	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
92A:						
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: large stones wetness
93:						
Tawas	Severe: excess humus ponding cutbanks cave	Severe: low strength subsides ponding	Severe: subsides ponding	Severe: low strength subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
Deford	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: excess humus ponding
94B:						
Keweenaw	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
Kalkaska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
94D:						
Keweenaw	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
Kalkaska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
94E:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
95B:						
Liminga	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: droughty
95D:						
Liminga	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope droughty
100E:						
Sayner	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
100F:						
Sayner	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
103D:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Ocqueoc	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
104C:						
Fence	Severe: cutbanks cave	Slight	Moderate: wetness	Moderate: slope	Severe: frost action	Slight
105C:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: wetness droughty
106B:						
Sagola	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
106D:						
Sagola	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
107B:						
Goodman	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
Sundog	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
107D:						
Goodman	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
107D:						
Sundog	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty
107F:						
Goodman	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
108B:						
Goodman	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
Sundog	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
Wabeno	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: large stones
108D:						
Goodman	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope
Sundog	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty
Wabeno	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: frost action slope wetness	Moderate: large stones slope wetness
109B:						
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
Keweenaw	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: large stones droughty
109D:						
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
Keweenaw	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: large stones slope droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
109F:						
Rubicon	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
110B:						
Nadeau	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action large stones	Moderate: large stones droughty
Mancelona	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: large stones droughty
110D:						
Nadeau	Severe: cutbanks cave	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: frost action large stones slope	Moderate: large stones slope droughty
Mancelona	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: large stones slope droughty
111B:						
Grayling	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
112D:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
112F:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
113B:						
Vanriper	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action large stones	Severe: large stones
113D:						
Vanriper	Moderate: large stones slope	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: frost action large stones slope	Severe: large stones
113F:						
Vanriper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
114B:						
Vanriper	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: frost action large stones	Severe: large stones
114D:						
Vanriper	Moderate: large stones slope	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: frost action large stones slope	Severe: large stones
114F:						
Vanriper	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
117B:						
Fence	Severe: cutbanks cave	Slight	Moderate: wetness	Slight	Severe: frost action	Slight
118A:						
Croswell	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Moderate: droughty
Deford	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: excess humus ponding
119B:						
Yalmer	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Severe: droughty
Kalkaska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
119D:						
Yalmer	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: slope wetness	Severe: droughty
Kalkaska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
121B:						
Onota	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: frost action depth to rock	Moderate: large stones small stones
122:						
Pleine	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus large stones ponding
123A:						
Tula	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: large stones wetness
124B:						
Gogebic	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Severe: large stones droughty
Dishno	Severe: wetness	Moderate: large stones wetness	Severe: wetness	Moderate: large stones slope wetness	Moderate: frost action large stones wetness	Severe: large stones
124D:						
Gogebic	Severe: wetness	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Severe: large stones droughty
Dishno	Severe: wetness	Moderate: large stones slope wetness	Severe: wetness	Severe: slope	Moderate: frost action slope wetness	Severe: large stones
125D:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
125F:						
Keweenaw	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
126B:						
Sundog	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
126D:						
Sundog	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty
126E:						
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
127B:						
Sundog	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
127D:						
Sundog	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty
127F:						
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
128B:						
Kalkaska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty
Waiska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: large stones droughty
128D:						
Kalkaska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
Waiska	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: large stones droughty
128E:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Waiska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
129C:						
Kalkaska	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: too sandy droughty
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: wetness droughty
130A:						
Chabeneau	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: large stones droughty
131:						
Witbeck	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
Cathro	Severe: excess humus ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
132. Slickens						
133B:						
Keewaydin	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Severe: large stones
Dishno	Severe: wetness	Moderate: large stones wetness	Severe: wetness	Moderate: large stones slope wetness	Moderate: frost action large stones wetness	Severe: large stones
133D:						
Keewaydin	Severe: cutbanks cave	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: large stones slope	Severe: large stones
Dishno	Severe: wetness	Moderate: large stones slope wetness	Severe: wetness	Severe: slope	Moderate: frost action slope wetness	Severe: large stones
134B:						
Keewaydin	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Severe: large stones
134D:						
Keewaydin	Severe: cutbanks cave	Moderate: large stones slope	Moderate: large stones slope	Severe: slope	Moderate: large stones slope	Severe: large stones
134F:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
135A:						
Witbeck	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
Net	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: large stones wetness
136A:						
Minocqua	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
Channing	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
137D:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones
137F:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
138D:						
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
138F:						
Sundog	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
139B:						
Sundog	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones droughty
139D:						
Sundog	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Moderate: large stones slope droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
140B:						
Champion	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Severe: large stones
Dishno	Severe: wetness	Moderate: large stones wetness	Severe: wetness	Moderate: large stones slope wetness	Moderate: frost action large stones wetness	Severe: large stones
140D:						
Champion	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: slope wetness	Moderate: frost action slope wetness	Severe: large stones
Dishno	Severe: wetness	Moderate: large stones slope wetness	Severe: wetness	Severe: slope	Moderate: frost action slope wetness	Severe: large stones
141D:						
Pelissier	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
142B:						
Pelissier	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
142D:						
Pelissier	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
144B:						
Farquar	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Severe: droughty
145C:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones wetness
Yalmer	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: slope wetness	Severe: droughty
146B:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones wetness
Skanee	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
147A:						
Skanee	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
Gay	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
148B:						
Shoepac	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones
Ensley	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
149:						
Evart	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness
Cathro	Severe: excess humus ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
150:						
Shag	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
151A:						
Spear	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
153D:						
Ishpeming	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
153F:						
Ishpeming	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
154B:						
Rubicon	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: too sandy droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
154B:						
Sayner	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
154D:						
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
Sayner	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: droughty
155A:						
Zeba	Severe: wetness cutbanks cave depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action wetness	Severe: wetness
Jacobsville	Severe: ponding cutbanks cave depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
156B:						
Duel	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Moderate: depth to rock droughty
157B:						
Reade	Severe: wetness depth to rock	Moderate: wetness depth to rock	Severe: wetness depth to rock	Moderate: wetness depth to rock	Moderate: frost action wetness depth to rock	Moderate: large stones depth to rock
Nahma	Severe: ponding depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
158C:						
Munising	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones wetness
Onota	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: frost action depth to rock	Moderate: large stones small stones
Yalmer	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: wetness	Severe: droughty
159A:						
Jeske	Severe: wetness cutbanks cave depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: wetness	Severe: wetness
160B:						
Paquin	Severe: cemented pan wetness cutbanks cave	Moderate: cemented pan wetness	Severe: cemented pan wetness	Moderate: cemented pan wetness	Moderate: cemented pan wetness	Severe: cemented pan

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
160B:						
Finch	Severe: cemented pan wetness cutbanks cave	Severe: wetness	Severe: cemented pan wetness	Severe: wetness	Severe: wetness	Severe: wetness too acid droughty
161B:						
Yellowdog	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: small stones droughty
162B:						
Buckroe	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: small stones droughty
165B:						
Chocolay	Severe: large stones wetness depth to rock	Severe: large stones	Severe: large stones wetness depth to rock	Severe: large stones	Severe: large stones	Severe: large stones
Waiska	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Severe: droughty
166:						
Skandia	Severe: excess humus ponding depth to rock	Severe: low strength ponding	Severe: ponding depth to rock	Severe: low strength ponding	Severe: frost action ponding	Severe: excess humus ponding
167:						
Skandia	Severe: excess humus ponding depth to rock	Severe: low strength ponding	Severe: ponding depth to rock	Severe: low strength ponding	Severe: frost action ponding	Severe: excess humus ponding
Jacobsville	Severe: ponding cutbanks cave depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
168B:						
Yellowdog	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: depth to rock	Severe: small stones droughty
Burt	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock
170B:						
Chocolay	Severe: large stones wetness depth to rock	Severe: large stones	Severe: large stones wetness depth to rock	Severe: large stones	Severe: large stones	Severe: large stones
171B:						
Paavola	Severe: large stones wetness cutbanks cave	Severe: large stones wetness	Severe: large stones wetness	Severe: large stones wetness	Severe: large stones	Severe: small stones droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
172D:						
Buckroe	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
172F:						
Buckroe	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones droughty
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
173B:						
Pence	Severe: cutbanks cave	Slight	Slight	Slight	Slight	Moderate: large stones droughty
173D:						
Pence	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: large stones slope droughty
174D:						
Yalmer	Severe: wetness cutbanks cave	Moderate: slope wetness	Severe: wetness	Severe: slope	Moderate: slope wetness	Severe: droughty
Rubicon	Severe: cutbanks cave	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope too sandy droughty
Urban land.						
175E:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Waiska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty
175F:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Waiska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
176B:						
Greenwood	Severe: excess humus ponding	Severe: low strength ponding	Severe: low strength ponding	Severe: low strength ponding	Severe: excess humus ponding	Severe: excess humus ponding
Croswell	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Moderate: too sandy droughty
177E:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
177F:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
178D:						
Schweitzer	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
178F:						
Schweitzer	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
179E:						
Schweitzer	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
180E:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
180F:						
Kalkaska	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
181E:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tokiahok	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
181F:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tokiahok	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
184C:						
Dishno	Severe: wetness	Moderate: large stones slope wetness	Severe: wetness	Severe: slope	Moderate: frost action slope wetness	Severe: large stones
Witbeck	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
Rock outcrop.						
185B:						
Northland	Severe: wetness cutbanks cave	Moderate: large stones wetness	Severe: wetness	Moderate: large stones wetness	Moderate: frost action large stones wetness	Moderate: droughty
187B:						
Reade	Severe: wetness depth to rock	Moderate: wetness depth to rock	Severe: wetness depth to rock	Moderate: wetness depth to rock	Moderate: frost action wetness depth to rock	Moderate: large stones depth to rock
190B:						
Emmet	Slight	Slight	Slight	Slight	Moderate: frost action	Slight
Cunard	Severe: depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: depth to rock	Moderate: frost action depth to rock	Moderate: large stones depth to rock droughty

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
191B:						
Nahma	Severe: ponding depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
Sundell	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action wetness	Severe: wetness
193E:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tokiahok	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
194E:						
Sporley	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: frost action slope	Severe: slope
196E:						
Frohling	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Onota	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope
Tokiahok	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
197B:						
Shoepac	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones
Trenary	Severe: cutbanks cave	Slight	Slight	Slight	Moderate: frost action	Moderate: large stones
198B:						
Shoepac	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Moderate: large stones
Reade	Severe: wetness depth to rock	Moderate: wetness depth to rock	Severe: wetness depth to rock	Moderate: wetness depth to rock	Moderate: frost action wetness depth to rock	Moderate: large stones depth to rock
199.						
Udorthents, ash						
200A:						
Charlevoix	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
200A:						
Ensley	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
201B:						
Sauxhead	Severe: wetness depth to rock	Severe: depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: small stones depth to rock
Jacobsville	Severe: ponding cutbanks cave depth to rock	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Severe: frost action ponding	Severe: excess humus ponding
202B:						
Sauxhead	Severe: wetness depth to rock	Severe: depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: small stones depth to rock
203A:						
Au Gres	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Deford	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: excess humus ponding
204B:						
Gogebic	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: frost action wetness	Severe: large stones droughty
Tula	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: large stones wetness
206B:						
Traunik	Severe: cutbanks cave	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones	Moderate: large stones small stones
207D:						
Dishno	Severe: wetness	Moderate: large stones wetness	Severe: wetness	Moderate: large stones slope wetness	Moderate: frost action large stones wetness	Severe: large stones
Michigamme	Severe: slope cutbanks cave depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
208F:						
Keewaydin	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
208F:						
Michigamme	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: large stones slope
209B:						
Garlic	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
Fence	Severe: cutbanks cave	Slight	Moderate: wetness	Slight	Severe: frost action	Slight
M-W. Miscellaneous water						
W. Water						

Table 14.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10B:					
Grayling	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
10D:					
Grayling	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
10E:					
Grayling	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
11C:					
Deer Park	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
11D:					
Deer Park	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
12B:					
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
12D:					
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
12E:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
12F:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
13B:					
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
13D:					
Kalkaska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
13E:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
13F:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
14B:					
Rousseau	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
14D:					
Rousseau	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
15A:					
Croswell	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy too acid
16A:					
Paquin	Severe: cemented pan wetness poor filter	Severe: cemented pan seepage wetness	Severe: seepage too sandy wetness	Severe: cemented pan seepage wetness	Poor: cemented pan seepage too sandy
17A:					
Au Gres	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy wetness
18:					
Kinross	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
19:					
Deford	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
20B:					
Rousseau	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Ocqueoc	Severe: percs slowly	Severe: seepage	Severe: too sandy	Severe: seepage	Poor: too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
20D:					
Rousseau	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Ocqueoc	Severe: percs slowly	Severe: seepage slope	Severe: too sandy	Severe: seepage	Poor: too sandy
20E:					
Rousseau	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Ocqueoc	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: slope too sandy
22B:					
Alcona	Moderate: percs slowly	Severe: seepage	Severe: too sandy	Slight	Fair: too sandy
24B:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
24D:					
Munising	Severe: percs slowly wetness	Severe: slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
25B:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
Yalmer	Severe: percs slowly wetness	Severe: seepage wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
25D:					
Munising	Severe: percs slowly wetness	Severe: slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
Yalmer	Severe: percs slowly wetness	Severe: seepage slope wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
26A:					
Skanee	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
27:					
Gay	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28B:					
Keweenaw	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage small stones
28D:					
Keweenaw	Moderate: slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor: seepage small stones
28E:					
Keweenaw	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: seepage slope small stones
29B:					
Yalmer	Severe: percs slowly wetness	Severe: seepage wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
29D:					
Yalmer	Severe: percs slowly wetness	Severe: seepage slope wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
31D:					
Trenary	Moderate: percs slowly slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope small stones
32A:					
Charlevoix	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
33:					
Ensley	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
34B:					
Onaway	Severe: percs slowly	Moderate: slope	Slight	Slight	Fair: small stones
34D:					
Onaway	Severe: percs slowly	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope small stones
34E:					
Onaway	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
35B:					
Champion	Severe: percs slowly wetness	Severe: large stones seepage	Severe: seepage wetness	Severe: wetness	Poor: seepage small stones

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
35D:					
Champion	Severe: percs slowly wetness	Severe: large stones seepage slope	Severe: seepage wetness	Severe: wetness	Poor: seepage small stones
36A:					
Net	Severe: percs slowly wetness	Severe: seepage wetness	Severe: seepage wetness too acid	Severe: seepage wetness	Poor: small stones wetness
37:					
Witbeck	Severe: percs slowly ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: small stones ponding
38B:					
Pence	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
38D:					
Pence	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
38E:					
Pence	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
39B:					
Amasa	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
39D:					
Amasa	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
39E:					
Amasa	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
40B:					
Waiska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
40D:					
Waiska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
41A:					
Channing	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage small stones too sandy
42:					
Minocqua	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage small stones too sandy
43B:					
Karlin	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
43D:					
Karlin	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
44B:					
Carlshend	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: wetness depth to rock
45A:					
Zeba	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: wetness depth to rock
46:					
Jacobsville	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
48:					
Burt	Severe: ponding depth to rock	Severe: seepage ponding depth to rock	Severe: seepage ponding depth to rock	Severe: ponding depth to rock	Poor: seepage too sandy depth to rock
50A:					
Sundell	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: wetness depth to rock
51:					
Nahma	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
52B:					
Summerville	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
55F:					
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
56D:					
Peshekee	Severe: depth to rock	Severe: large stones slope depth to rock	Severe: large stones depth to rock	Severe: depth to rock	Poor: large stones depth to rock
Rock outcrop	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
56E:					
Peshekee	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
56F:					
Peshekee	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
57:					
Carbondale	Severe: percs slowly subsides ponding	Severe: excess humus seepage ponding	Severe: excess humus seepage ponding	Severe: seepage ponding	Poor: excess humus ponding
Tawas	Severe: percs slowly subsides ponding	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
58:					
Greenwood	Severe: ponding	Severe: excess humus seepage ponding	Severe: excess humus seepage ponding	Severe: seepage ponding	Poor: excess humus ponding
Dawson	Severe: percs slowly subsides ponding	Severe: excess humus seepage ponding	Severe: excess humus seepage ponding	Severe: seepage ponding	Poor: excess humus ponding

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
59:					
Chippeny	Severe: percs slowly ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Poor: excess humus ponding depth to rock
Nahma	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
60:					
Histosols	Severe: ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: ponding	Poor: excess humus ponding
Aquents	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
61. Pits, borrow					
62B: Udorthents.					
Udipsamments	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
64. Pits and Dumps					
65B. Udorthents-Urban land					
66B:					
Udipsamments	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Urban land.					
67B: Urban land.					
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
68:					
Pits, quarries	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
69B:					
Escanaba	Moderate: percs slowly	Severe: seepage	Slight	Severe: seepage	Fair: small stones
69D:					
Escanaba	Moderate: percs slowly slope	Severe: seepage slope	Moderate: slope	Severe: seepage	Fair: slope small stones

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70B:					
Nadeau	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
70D:					
Nadeau	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
71B:					
Evart	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy wetness
Pelkie	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy
Sturgeon	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy wetness
72B:					
Emmet	Moderate: percs slowly	Moderate: slope	Slight	Slight	Fair: small stones
72D:					
Emmet	Moderate: percs slowly slope	Severe: slope	Moderate: slope	Moderate: seepage	Fair: slope small stones
72E:					
Emmet	Severe: slope	Severe: slope	Severe: slope	Severe: seepage slope	Poor: slope
73B:					
Gogebic	Severe: percs slowly wetness	Severe: large stones	Severe: large stones wetness	Severe: wetness	Poor: large stones wetness
73D:					
Gogebic	Severe: percs slowly wetness	Severe: large stones slope	Severe: large stones wetness	Severe: wetness	Poor: large stones wetness
74D:					
Schweitzer	Severe: percs slowly slope	Severe: slope	Severe: large stones slope too acid	Severe: slope	Poor: slope small stones
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop.					

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
74F:					
Schweitzer	Severe: percs slowly, slope	Severe: slope	Severe: large stones, slope, too acid	Severe: slope	Poor: slope, small stones
Michigamme	Severe: slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: large stones, slope, depth to rock	Severe: slope, depth to rock	Poor: large stones, slope, depth to rock
Rock outcrop.					
76C:					
Garlic	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy
Alcona	Moderate: percs slowly	Severe: seepage	Severe: too sandy	Slight	Fair: too sandy
Voelker	Severe: percs slowly	Severe: seepage, slope	Severe: too sandy	Severe: seepage	Poor: too sandy
76E:					
Garlic	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, slope, too sandy
Alcona	Severe: slope	Severe: seepage, slope	Severe: slope, too sandy	Severe: slope	Poor: slope, too sandy
Voelker	Severe: percs slowly, slope	Severe: seepage, slope	Severe: slope, too sandy	Severe: seepage, slope	Poor: slope, too sandy
76F:					
Garlic	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, slope, too sandy
Alcona	Severe: slope	Severe: seepage, slope	Severe: slope, too sandy	Severe: slope	Poor: slope, too sandy
Voelker	Severe: percs slowly, slope	Severe: seepage, slope	Severe: slope, too sandy	Severe: seepage, slope	Poor: slope, too sandy
77D:					
Garlic	Severe: poor filter	Severe: seepage, slope	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, too sandy
Alcona	Moderate: percs slowly	Severe: seepage, slope	Severe: too sandy	Slight	Poor: too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
77D:					
Voelker	Severe: percs slowly	Severe: seepage slope	Severe: too sandy	Severe: seepage	Poor: too sandy
77E:					
Garlic	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Alcona	Severe: slope	Severe: seepage slope	Severe: slope too sandy	Severe: slope	Poor: slope too sandy
Voelker	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: slope too sandy
78C:					
Keweenaw	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage small stones
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
78E:					
Keweenaw	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: seepage slope small stones
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
78F:					
Keweenaw	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: seepage slope small stones
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
79B:					
Keweenaw	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage small stones
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
80B:					
Sayner	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
80D:					
Sayner	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
80E:					
Sayner	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
81B:					
Pelissier	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
81D:					
Pelissier	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
81E:					
Pelissier	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
84D:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Ishpeming	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: seepage too sandy depth to rock
Rock outcrop.					

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
84F:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Ishpeming	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: seepage too sandy depth to rock
Rock outcrop.					
85A:					
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: small stones wetness
86B:					
Mashek	Severe: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
87B:					
Cunard	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
88:					
Cathro	Severe: percs slowly ponding	Severe: excess humus seepage ponding	Severe: ponding	Severe: seepage ponding	Poor: ponding
Ensley	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
89B:					
Emmet	Moderate: percs slowly	Moderate: seepage slope	Severe: seepage	Slight	Fair: small stones
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: small stones wetness
90B:					
Emmet	Moderate: percs slowly	Moderate: seepage slope	Slight	Slight	Fair: small stones
Escanaba	Moderate: percs slowly	Severe: seepage	Slight	Severe: seepage	Fair: small stones
90D:					
Emmet	Moderate: percs slowly slope	Severe: slope	Moderate: seepage	Moderate: slope	Fair: slope small stones
Escanaba	Moderate: percs slowly slope	Severe: seepage slope	Moderate: slope	Severe: seepage	Fair: slope small stones

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
91B:					
Onaway	Severe: percs slowly	Moderate: slope	Slight	Slight	Fair: small stones
Nadeau	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
92A:					
Ensley	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
Solona	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: small stones wetness
93:					
Tawas	Severe: percs slowly subsides ponding	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
Deford	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
94B:					
Keweenaw	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage small stones
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
94D:					
Keweenaw	Moderate: slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor: seepage small stones
Kalkaska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
94E:					
Keweenaw	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: seepage slope small stones
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
95B:					
Liminga	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
95D:					
Liminga	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: too sandy
100E:					
Sayner	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
100F:					
Sayner	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
103D:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Ocqueoc	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: slope too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
104C:					
Fence	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness
105C:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
106B:					
Sagola	Slight	Moderate: seepage	Slight	Slight	Good
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
106D:					
Sagola	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
107B:					
Goodman	Moderate: percs slowly	Moderate: seepage slope	Severe: seepage too acid	Slight	Poor: seepage small stones
Sundog	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
107D:					
Goodman	Moderate: percs slowly slope	Severe: slope	Severe: seepage too acid	Moderate: slope	Poor: seepage small stones
Sundog	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
107F:					
Goodman	Severe: slope	Severe: slope	Severe: seepage slope too acid	Severe: slope	Poor: seepage slope small stones
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
108B:					
Goodman	Moderate: percs slowly	Moderate: seepage slope	Severe: seepage too acid	Slight	Poor: seepage small stones
Sundog	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Wabeno	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness too acid	Moderate: wetness	Poor: seepage small stones
108D:					
Goodman	Moderate: percs slowly slope	Severe: slope	Severe: seepage too acid	Moderate: slope	Poor: seepage small stones
Sundog	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
108D:					
Wabeno	Severe: percs slowly wetness	Severe: slope	Severe: wetness too acid	Moderate: slope wetness	Poor: seepage small stones
109B:					
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Keweenaw	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage small stones
109D:					
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Keweenaw	Moderate: slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor: seepage small stones
109F:					
Rubicon	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Keweenaw	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: seepage slope small stones
110B:					
Nadeau	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Mancelona	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
110D:					
Nadeau	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Mancelona	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
111B:					
Grayling	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
112D:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
112F:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
113B:					
Vanriper	Moderate: large stones percs slowly	Severe: large stones	Severe: large stones	Slight	Poor: large stones
113D:					
Vanriper	Moderate: large stones percs slowly slope	Severe: large stones slope	Severe: large stones	Moderate: slope	Poor: large stones
113F:					
Vanriper	Severe: slope	Severe: large stones slope	Severe: large stones slope	Severe: slope	Poor: large stones slope
114B:					
Vanriper	Moderate: large stones percs slowly	Severe: large stones	Severe: large stones	Slight	Poor: large stones
114D:					
Vanriper	Moderate: large stones percs slowly slope	Severe: large stones slope	Severe: large stones	Moderate: slope	Poor: large stones
114F:					
Vanriper	Severe: slope	Severe: large stones slope	Severe: large stones slope	Severe: slope	Poor: large stones slope

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
117B:					
Fence	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness
118A:					
Croswell	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy too acid
Deford	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
119B:					
Yalmer	Severe: percs slowly wetness	Severe: seepage wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
119D:					
Yalmer	Severe: percs slowly wetness	Severe: seepage slope wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
Kalkaska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
121B:					
Onota	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
122:					
Pleine	Severe: ponding	Severe: excess humus large stones ponding	Severe: large stones ponding	Severe: ponding	Poor: small stones ponding
123A:					
Tula	Severe: percs slowly wetness	Severe: large stones	Severe: wetness	Severe: wetness	Poor: seepage small stones wetness
124B:					
Gogebic	Severe: percs slowly wetness	Severe: large stones	Severe: large stones wetness	Severe: wetness	Poor: large stones wetness
Dishno	Severe: wetness	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Fair: small stones wetness depth to rock

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
124D:					
Gogebic	Severe: percs slowly, wetness	Severe: large stones, slope	Severe: large stones, wetness	Severe: wetness	Poor: large stones, wetness
Dishno	Severe: wetness	Severe: wetness	Severe: depth to rock	Severe: wetness	Fair: slope, small stones, depth to rock
125D:					
Keweenaw	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, slope, small stones
Kalkaska	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, slope, too sandy
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
125F:					
Keweenaw	Severe: slope	Severe: seepage, slope	Severe: seepage, slope	Severe: seepage, slope	Poor: seepage, slope, small stones
Kalkaska	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, slope, too sandy
Rock outcrop	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Severe: slope, depth to rock	Poor: slope, depth to rock
126B:					
Sundog	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, small stones, too sandy
126D:					
Sundog	Severe: poor filter	Severe: seepage, slope	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, small stones, too sandy
126E:					
Sundog	Severe: slope, poor filter	Severe: seepage, slope	Severe: seepage, slope, too sandy	Severe: seepage, slope	Poor: seepage, small stones, too sandy
127B:					
Sundog	Severe: poor filter	Severe: seepage	Severe: seepage, too sandy	Severe: seepage	Poor: seepage, small stones, too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
127D:					
Sundog	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
127F:					
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
128B:					
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Waiska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
128D:					
Kalkaska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Waiska	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
128E:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Waiska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
129C:					
Kalkaska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
130A:					
Chabeneau	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage small stones too sandy
131:					
Witbeck	Severe: percs slowly ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: small stones ponding

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
131:					
Cathro	Severe: percs slowly ponding	Severe: excess humus seepage ponding	Severe: ponding	Severe: seepage ponding	Poor: ponding
132. Slickens					
133B:					
Keewaydin	Severe: poor filter	Severe: large stones seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Dishno	Severe: wetness	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Fair: small stones wetness depth to rock
133D:					
Keewaydin	Severe: poor filter	Severe: large stones seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
Dishno	Severe: wetness	Severe: wetness	Severe: depth to rock	Severe: wetness	Fair: slope small stones depth to rock
134B:					
Keewaydin	Severe: poor filter	Severe: large stones seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
134D:					
Keewaydin	Severe: poor filter	Severe: large stones seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
134F:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
135A:					
Witbeck	Severe: percs slowly ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: small stones ponding
Net	Severe: percs slowly wetness	Severe: seepage wetness	Severe: seepage wetness too acid	Severe: seepage wetness	Poor: small stones wetness

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
136A:					
Minocqua	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage small stones too sandy
Channing	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage small stones too sandy
137D:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
137F:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
138D:					
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
138F:					
Sundog	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
139B:					
Sundog	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
139D:					
Sundog	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
140B:					
Champion	Severe: percs slowly wetness	Severe: large stones seepage	Severe: seepage wetness	Severe: wetness	Poor: seepage small stones
Dishno	Severe: wetness	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Fair: seepage small stones
140D:					
Champion	Severe: percs slowly wetness	Severe: large stones seepage slope	Severe: seepage wetness	Severe: wetness	Poor: seepage small stones
Dishno	Severe: wetness	Severe: wetness	Severe: depth to rock	Severe: wetness	Fair: small stones wetness depth to rock
141D:					
Pelissier	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
142B:					
Pelissier	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
142D:					
Pelissier	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
144B:					
Farquar	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage small stones too sandy
145C:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
Yalmer	Severe: percs slowly wetness	Severe: seepage slope wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
146B:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
146B:					
Skanee	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
147A:					
Skanee	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
Gay	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
148B:					
Shoepac	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness too acid	Severe: wetness	Fair: wetness
Ensley	Severe: ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
149:					
Evart	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy wetness
Cathro	Severe: percs slowly ponding	Severe: excess humus seepage ponding	Severe: ponding	Severe: seepage ponding	Poor: ponding
150:					
Shag	Severe: percs slowly ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: ponding
151A:					
Spear	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
153D:					
Ishpeming	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: seepage slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
153F:					
Ishpeming	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: seepage slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
154B:					
Rubicon	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Sayner	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
154D:					
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Sayner	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
155A:					
Zeba	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: wetness depth to rock
Jacobsville	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
156B:					
Duel	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage too sandy depth to rock	Severe: seepage depth to rock	Poor: seepage too sandy depth to rock
157B:					
Reade	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
Nahma	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
158C:					
Munising	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness	Severe: wetness	Poor: seepage wetness
Onota	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
Yalmer	Severe: percs slowly wetness	Severe: seepage wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
159A:					
Jeske	Severe: wetness depth to rock	Severe: seepage wetness depth to rock	Severe: seepage wetness depth to rock	Severe: seepage wetness depth to rock	Poor: seepage too sandy depth to rock
160B:					
Paquin	Severe: cemented pan wetness poor filter	Severe: cemented pan seepage wetness	Severe: seepage too sandy wetness	Severe: cemented pan seepage wetness	Poor: cemented pan seepage too sandy
Finch	Severe: cemented pan wetness poor filter	Severe: cemented pan seepage wetness	Severe: seepage too sandy wetness	Severe: cemented pan seepage wetness	Poor: cemented pan seepage too sandy
161B:					
Yellowdog	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: seepage too sandy depth to rock
162B:					
Buckroe	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
165B:					
Chocolay	Severe: large stones wetness depth to rock	Severe: large stones wetness depth to rock	Severe: large stones wetness depth to rock	Severe: depth to rock	Poor: large stones depth to rock
Waiska	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
166:					
Skandia	Severe: ponding depth to rock	Severe: excess humus seepage depth to rock	Severe: seepage ponding depth to rock	Severe: seepage ponding depth to rock	Poor: excess humus ponding depth to rock
167:					
Skandia	Severe: ponding depth to rock	Severe: excess humus seepage depth to rock	Severe: seepage ponding depth to rock	Severe: seepage ponding depth to rock	Poor: excess humus ponding depth to rock
Jacobsville	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
168B:					
Yellowdog	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: seepage too sandy depth to rock

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
168B:					
Burt	Severe: ponding depth to rock	Severe: excess humus seepage depth to rock	Severe: seepage ponding depth to rock	Severe: ponding depth to rock	Poor: seepage too sandy depth to rock
170B:					
Chocolay	Severe: large stones wetness depth to rock	Severe: large stones wetness depth to rock	Severe: large stones wetness depth to rock	Severe: depth to rock	Poor: large stones depth to rock
171B:					
Paavola	Severe: large stones percs slowly wetness	Severe: large stones	Severe: large stones wetness	Severe: wetness	Poor: seepage small stones wetness
172D:					
Buckroe	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: slope depth to rock	Poor: seepage too sandy depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
172F:					
Buckroe	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: slope depth to rock	Poor: seepage too sandy depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
173B:					
Pence	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
173D:					
Pence	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
174D:					
Yalmer	Severe: percs slowly wetness	Severe: seepage slope wetness	Severe: wetness too acid	Severe: seepage	Poor: too acid
Rubicon	Severe: poor filter	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Urban land.					

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
175E:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Waiska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
175F:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Waiska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
176B:					
Greenwood	Severe: ponding	Severe: excess humus seepage ponding	Severe: excess humus seepage ponding	Severe: seepage ponding	Poor: excess humus ponding
Croswell	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy too acid
177E:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
177F:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
178D:					
Schweitzer	Severe: percs slowly slope	Severe: slope	Severe: large stones slope too acid	Severe: slope	Poor: slope small stones
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
178F:					
Schweitzer	Severe: percs slowly slope	Severe: slope	Severe: large stones slope too acid	Severe: slope	Poor: slope small stones

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
178F:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
179E:					
Schweitzer	Severe: percs slowly slope	Severe: slope	Severe: large stones slope too acid	Severe: slope	Poor: slope small stones
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
180E:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
180F:					
Kalkaska	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
181E:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
Tokiahok	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
181F:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
Tokiahok	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
184C:					
Dishno	Severe: depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Fair: small stones wetness depth to rock
Witbeck	Severe: percs slowly ponding	Severe: excess humus ponding	Severe: ponding	Severe: ponding	Poor: small stones ponding
Rock outcrop.					
185B:					
Northland	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
187B:					
Reade	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
190B:					
Emmet	Moderate: percs slowly	Moderate: seepage slope	Slight	Slight	Fair: small stones
Cunard	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
191B:					
Nahma	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
Sundell	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: wetness depth to rock
193E:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope
Tokiahok	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
194E:					
Sporley	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
196E:					
Frohling	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: seepage slope

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
196E:					
Onota	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Tokiahok	Severe: percs slowly slope	Severe: seepage slope	Severe: slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
197B:					
Shoepac	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness too acid	Severe: wetness	Fair: wetness
Trenary	Moderate: percs slowly	Moderate: seepage slope	Slight	Slight	Fair: small stones
198B:					
Shoepac	Severe: percs slowly wetness	Moderate: seepage slope	Severe: wetness too acid	Severe: wetness	Poor: wetness
Reade	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
199. Udorthents, ash					
200A:					
Charlevoix	Severe: wetness	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Poor: wetness
Ensley	Severe: ponding	Severe: excess humus ponding	Severe: ponding depth to rock	Severe: ponding	Poor: ponding
201B:					
Sauxhead	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: too sandy depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
Jacobsville	Severe: ponding depth to rock	Severe: excess humus ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: ponding depth to rock
202B:					
Sauxhead	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: too sandy depth to rock	Severe: depth to rock	Poor: seepage too sandy depth to rock
203A:					
Au Gres	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy wetness

Table 14.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
203A:					
Deford	Severe: ponding poor filter	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
204B:					
Gogebic	Severe: percs slowly wetness	Severe: large stones	Severe: large stones wetness	Severe: wetness	Poor: large stones wetness
Tula	Severe: percs slowly wetness	Severe: large stones	Severe: wetness	Severe: wetness	Poor: seepage small stones wetness
206B:					
Traunik	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
207D:					
Dishno	Severe: wetness	Severe: wetness	Severe: depth to rock	Severe: wetness	Poor: slope
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
Rock outcrop	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
208F:					
Keewaydin	Severe: slope poor filter	Severe: large stones seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage small stones too sandy
Michigamme	Severe: slope depth to rock	Severe: large stones slope depth to rock	Severe: large stones slope depth to rock	Severe: slope depth to rock	Poor: large stones slope depth to rock
209B:					
Garlic	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
Fence	Severe: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
M-W.					
Miscellaneous water					
W.					
Water					

Table 15.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
10B:				
Grayling	Good	Probable	Improbable: too sandy	Poor: too sandy too acid
10D:				
Grayling	Good	Probable	Improbable: too sandy	Poor: too sandy too acid
10E:				
Grayling	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy too acid
11C:				
Deer Park	Good	Probable	Improbable: too sandy	Poor: too sandy too acid
11D:				
Deer Park	Good	Probable	Improbable: too sandy	Poor: too sandy too acid
12B:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
12D:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
12E:				
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
12F:				
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
13B:				
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
13D:				
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
13E:				
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
13F:				
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
14B:				
Rousseau	Good	Probable	Improbable: too sandy	Poor: too sandy
14D:				
Rousseau	Good	Probable	Improbable: too sandy	Poor: too sandy
15A:				
Croswell	Fair: wetness	Probable	Improbable: too sandy	Poor: too sandy
16A:				
Paquin	Fair: wetness	Probable	Improbable: too sandy	Poor: area reclaim cemented pan too sandy
17A:				
Au Gres	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness too acid
18:				
Kinross	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
19:				
Deford	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
20B:				
Rousseau	Good	Probable	Improbable: too sandy	Poor: too sandy
Ocqueoc	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
20D:				
Rousseau	Good	Probable	Improbable: too sandy	Poor: too sandy
Ocqueoc	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
20E:				
Rousseau	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Ocqueoc	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
22B:				
Alcona	Good	Improbable: excess fines	Improbable: excess fines	Good
24B:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
24D:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim slope
25B:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
25D:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim slope
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
26A:				
Skanee	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim wetness
27:				
Gay	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
28B:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
28D:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
28E:				
Keweenaw	Poor: slope	Probable	Improbable: too sandy	Poor: too sandy
29B:				
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
29D:				
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
31D:				
Trenary	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope small stones

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
32A:				
Charlevoix	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
33:				
Ensley	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
34B:				
Onaway	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
34D:				
Onaway	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope small stones
34E:				
Onaway	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
35B:				
Champion	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
35D:				
Champion	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
36A:				
Net	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
37:				
Witbeck	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
38B:				
Pence	Good	Probable	Probable	Poor: area reclaim small stones too sandy
38D:				
Pence	Good	Probable	Probable	Poor: area reclaim small stones too sandy
38E:				
Pence	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
39B:				
Amasa	Good	Probable	Probable	Poor: area reclaim small stones
39D:				
Amasa	Good	Probable	Probable	Poor: area reclaim small stones
39E:				
Amasa	Poor: slope	Probable	Probable	Poor: area reclaim slope small stones
40B:				
Waiska	Good	Probable	Probable	Poor: area reclaim small stones too sandy
40D:				
Waiska	Good	Probable	Probable	Poor: area reclaim small stones too sandy
41A:				
Channing	Poor: wetness	Probable	Probable	Poor: area reclaim small stones wetness
42:				
Minocqua	Poor: wetness	Probable	Probable	Poor: area reclaim small stones wetness
43B:				
Karlin	Good	Probable	Improbable: too sandy	Fair: small stones too sandy
43D:				
Karlin	Good	Probable	Improbable: too sandy	Fair: slope small stones too sandy
44B:				
Carlshend	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
45A:				
Zeba	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
46:				
Jacobsville	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
48:				
Burt	Poor: wetness depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: too sandy wetness depth to rock
50A:				
Sundell	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: wetness
51:				
Nahma	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
52B:				
Summerville	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: depth to rock
55F:				
Michigamme	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
56D:				
Peshekee	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones depth to rock
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: depth to rock
56E:				
Peshekee	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope depth to rock
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
56F:				
Peshekee	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope depth to rock
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
57:				
Carbondale	Poor: low strength wetness	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Tawas	Poor: wetness	Probable	Improbable: too sandy	Poor: excess humus wetness
58:				
Greenwood	Poor: low strength wetness	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Dawson	Poor: wetness	Probable	Improbable: too sandy	Poor: excess humus wetness
59:				
Chippeny	Poor: wetness depth to rock	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Nahma	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
60:				
Histosols	Poor: low strength wetness	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Aquents	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
61. Pits, borrow				
62B: Udorthents.				
Udipsamments	Good	Probable	Improbable: too sandy	Poor: too sandy
64. Pits and Dumps				
65B. Udorthents-Urban land				
66B:				
Udipsamments	Good	Probable	Improbable: too sandy	Poor: too sandy
Urban land.				
67B: Urban land.				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
68:				
Pits, quarries	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
69B:				
Escanaba	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
69D:				
Escanaba	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
70B:				
Nadeau	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
70D:				
Nadeau	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
71B:				
Evart	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
Pelkie	Fair: wetness	Probable	Improbable: too sandy	Poor: too sandy
Sturgeon	Poor: wetness	Probable	Improbable: too sandy	Poor: wetness
72B:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
72D:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope small stones
72E:				
Emmet	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
73B:				
Gogebic	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
73D:				
Gogebic	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
74D:				
Schweitzer	Fair: large stones slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Michigamme	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop.				
74F:				
Schweitzer	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Michigamme	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop.				
76C:				
Garlic	Good	Probable	Improbable: too sandy	Poor: too sandy
Alcona	Good	Improbable: excess fines	Improbable: excess fines	Good
Voelker	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
76E:				
Garlic	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Alcona	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
Voelker	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
76F:				
Garlic	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Alcona	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
Voelker	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
77D:				
Garlic	Good	Probable	Improbable: too sandy	Poor: too sandy
Alcona	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope
Voelker	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
77E:				
Garlic	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Alcona	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
Voelker	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
78C:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
78E:				
Keweenaw	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Kalkaska	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
78F:				
Keweenaw	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
79B:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
80B:				
Sayner	Good	Probable	Improbable: too sandy	Poor: too sandy
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
80D:				
Sayner	Good	Probable	Improbable: too sandy	Poor: too sandy
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
80E:				
Sayner	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
81B:				
Pelissier	Good	Probable	Probable	Poor: area reclaim small stones too sandy
81D:				
Pelissier	Good	Probable	Probable	Poor: area reclaim small stones too sandy
81E:				
Pelissier	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
84D:				
Rubicon	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Ishpeming	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: slope too sandy
Rock outcrop.				
84F:				
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Ishpeming	Poor: slope depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: slope too sandy
Rock outcrop.				
85A:				
Solona	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
86B:				
Mashek	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
87B:				
Cunard	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones depth to rock
88:				
Cathro	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: excess humus wetness
Ensley	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
89B:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Solona	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
90B:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Escanaba	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
90D:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Escanaba	Good	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
91B:				
Onaway	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Nadeau	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
92A:				
Ensley	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
Solona	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
93:				
Tawas	Poor: wetness	Probable	Improbable: too sandy	Poor: excess humus wetness
Deford	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
94B:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
94D:				
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
94E:				
Keweenaw	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
95B:				
Liminga	Good	Probable	Improbable: excess fines	Poor: too sandy
95D:				
Liminga	Good	Probable	Improbable: excess fines	Poor: too sandy
100E:				
Sayner	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rubicon	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
100F:				
Sayner	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
103D:				
Rubicon	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Ocqueoc	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
104C:				
Fence	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Good
105C:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
106B:				
Sagola	Good	Improbable: excess fines	Improbable: excess fines	Good
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
106D:				
Sagola	Good	Improbable: excess fines	Improbable: excess fines	Fair
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
107B:				
Goodman	Good	Improbable: excess fines	Improbable: excess fines	Good
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
107D:				
Goodman	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
107F:				
Goodman	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Sundog	Poor: slope	Probable	Probable	Poor: slope
108B:				
Goodman	Good	Improbable: excess fines	Improbable: excess fines	Good
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
Wabeno	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
108D:				
Goodman	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
Wabeno	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim slope
109B:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
109D:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
Keweenaw	Good	Probable	Improbable: too sandy	Poor: too sandy
109F:				
Rubicon	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Keweenaw	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
110B:				
Nadeau	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
Mancelona	Good	Probable	Probable	Poor: area reclaim small stones too sandy
110D:				
Nadeau	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
Mancelona	Good	Probable	Probable	Poor: area reclaim small stones too sandy
111B:				
Grayling	Good	Probable	Improbable: too sandy	Poor: too sandy too acid

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
112D:				
Keewaydin	Fair: large stones slope	Probable	Probable	Poor: area reclaim large stones
Michigamme	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
112F:				
Keewaydin	Poor: slope	Probable	Probable	Poor: area reclaim large stones
Michigamme	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
113B:				
Vanriper	Fair: large stones	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
113D:				
Vanriper	Fair: large stones	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
113F:				
Vanriper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones slope
114B:				
Vanriper	Fair: large stones	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
114D:				
Vanriper	Fair: large stones	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
114F:				
Vanriper	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones slope
117B:				
Fence	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Good

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
118A:				
Croswell	Fair: wetness	Probable	Improbable: too sandy	Poor: too sandy too acid
Deford	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
119B:				
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
119D:				
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy
121B:				
Onota	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: depth to rock
122:				
Pleine	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones wetness
123A:				
Tula	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
124B:				
Gogebic	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
Dishno	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
124D:				
Gogebic	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
Dishno	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
125D:				
Keweenaw	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
125D:				
Kalkaska	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
125F:				
Keweenaw	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
126B:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
126D:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
126E:				
Sundog	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
127B:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
127D:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
127F:				
Sundog	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
128B:				
Kalkaska	Good	Probable	Improbable: too sandy	Poor: too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
128B:				
Waiska------------------	Good	Probable	Probable	Poor: area reclaim small stones too sandy
128D:				
Kalkaska----------------	Good	Probable	Improbable: too sandy	Poor: too sandy
Waiska------------------	Good	Probable	Probable	Poor: area reclaim small stones too sandy
128E:				
Kalkaska----------------	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Waiska------------------	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
129C:				
Kalkaska----------------	Good	Probable	Improbable: too sandy	Poor: too sandy
Munising----------------	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
130A:				
Chabeneau---------------	Fair: wetness	Probable	Probable	Poor: area reclaim small stones
131:				
Witbeck-----------------	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
Cathro------------------	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: thin layer wetness
132.				
Slickens				
133B:				
Keewaydin---------------	Fair: large stones	Probable	Probable	Poor: area reclaim large stones
Dishno------------------	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
133D:				
Keewaydin---------------	Fair: large stones	Probable	Probable	Poor: area reclaim large stones

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
133D:				
Dishno------------------	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
134B:				
Keewaydin---------------	Fair: large stones	Probable	Probable	Poor: area reclaim large stones
134D:				
Keewaydin---------------	Fair: large stones	Probable	Probable	Poor: area reclaim large stones
134F:				
Keewaydin---------------	Poor: slope	Probable	Probable	Poor: area reclaim large stones
135A:				
Witbeck-----------------	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
Net---------------------	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
136A:				
Minocqua----------------	Poor: wetness	Probable	Probable	Poor: area reclaim small stones
Channing----------------	Poor: wetness	Probable	Probable	Poor: area reclaim small stones wetness
137D:				
Keewaydin---------------	Good	Probable	Probable	Poor: area reclaim large stones
Sundog------------------	Good	Probable	Probable	Poor: area reclaim small stones too sandy
137F:				
Keewaydin---------------	Poor: slope	Probable	Probable	Poor: area reclaim large stones
Sundog------------------	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
138D:				
Sundog	Fair: slope	Probable	Probable	Poor: area reclaim small stones too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
138F:				
Sundog	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
139B:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
139D:				
Sundog	Good	Probable	Probable	Poor: area reclaim small stones too sandy
140B:				
Champion	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
Dishno	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
140D:				
Champion	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
Dishno	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
141D:				
Pelissier	Fair: slope	Probable	Probable	Poor: area reclaim small stones too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
142B:				
Pelissier	Good	Probable	Probable	Poor: area reclaim small stones too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
142D:				
Pelissier	Good	Probable	Probable	Poor: area reclaim small stones too sandy
144B:				
Farquar	Fair: wetness	Probable	Probable	Poor: area reclaim small stones too sandy
145C:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
146B:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Skanee	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim wetness
147A:				
Skanee	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim wetness
Gay	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
148B:				
Shoepac	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Ensley	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
149:				
Evart	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
Cathro	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: excess humus wetness
150:				
Shag	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
151A:				
Spear	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
153D:				
Ishpeming	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: excess fines depth to rock	Poor: slope depth to rock
153F:				
Ishpeming	Poor: slope depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
154B:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
Sayner	Good	Probable	Improbable: too sandy	Poor: too sandy
154D:				
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
Sayner	Good	Probable	Improbable: too sandy	Poor: too sandy
155A:				
Zeba	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
Jacobsville	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
156B:				
Duel	Poor: depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: too sandy
157B:				
Reade	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones depth to rock
Nahma	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
158C:				
Munising	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Onota	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: depth to rock
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
159A:				
Jeske	Poor: wetness depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: too sandy wetness
160B:				
Paquin	Fair: wetness	Probable	Improbable: too sandy	Poor: area reclaim cemented pan too sandy
Finch	Poor: wetness	Probable	Improbable: too sandy	Poor: area reclaim cemented pan too sandy
161B:				
Yellowdog	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy
162B:				
Buckroe	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy depth to rock
165B:				
Chocolay	Poor: large stones depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: large stones
Waiska	Good	Probable	Probable	Poor: area reclaim small stones too sandy
166:				
Skandia	Poor: wetness depth to rock	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
167:				
Skandia	Poor: wetness depth to rock	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Jacobsville	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
168B:				
Yellowdog	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy
Burt	Poor: wetness depth to rock	Improbable: thin layer	Improbable: too sandy	Poor: too sandy wetness depth to rock

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
170B:				
Chocolay	Poor: large stones depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: large stones
171B:				
Paavola	Poor: large stones	Improbable: large stones	Improbable: large stones	Poor: area reclaim small stones too sandy
172D:				
Buckroe	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy depth to rock
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
172F:				
Buckroe	Poor: slope depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy depth to rock
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock
173B:				
Pence	Good	Probable	Probable	Poor: area reclaim small stones too sandy
173D:				
Pence	Good	Probable	Probable	Poor: area reclaim small stones too sandy
174D:				
Yalmer	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
Rubicon	Good	Probable	Improbable: too sandy	Poor: too sandy
Urban land.				
175E:				
Kalkaska	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Waiska	Fair: slope	Probable	Probable	Poor: area reclaim small stones too sandy

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
175F:				
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Waiska	Poor: slope	Probable	Probable	Poor: area reclaim small stones too sandy
176B:				
Greenwood	Poor: low strength wetness	Improbable: excess humus	Improbable: excess humus	Poor: excess humus wetness
Croswell	Fair: wetness	Probable	Improbable: too sandy	Poor: too sandy
177E:				
Frohling	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
177F:				
Frohling	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
178D:				
Schweitzer	Fair: large stones slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Kalkaska	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: excess fines depth to rock	Poor: slope depth to rock
178F:				
Schweitzer	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Rock outcrop	Poor: slope depth to rock	Improbable: depth to rock	Improbable: excess fines depth to rock	Poor: slope depth to rock
179E:				
Schweitzer	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope small stones

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
179E:				
Michigamme	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
180E:				
Kalkaska	Fair: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Frohling	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
180F:				
Kalkaska	Poor: slope	Probable	Improbable: too sandy	Poor: slope too sandy
Frohling	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
181E:				
Frohling	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Tokiahok	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
181F:				
Frohling	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Tokiahok	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
184C:				
Dishno	Fair: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
Witbeck	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
Rock outcrop.				
185B:				
Northland	Fair: wetness	Probable	Probable	Poor: area reclaim small stones too sandy
187B:				
Reade	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones depth to rock

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
190B:				
Emmet	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
Cunard	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones depth to rock
191B:				
Nahma	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
Sundell	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: wetness
193E:				
Frohling	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Tokiahok	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
194E:				
Sporley	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
196E:				
Frohling	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Onota	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope
Tokiahok	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too sandy
197B:				
Shoepac	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Trenary	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
198B:				
Shoepac	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim
Reade	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones depth to rock
199.				
Udorthents, ash				

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
200A:				
Charlevoix	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
Ensley	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
201B:				
Sauxhead	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy depth to rock
Jacobsville	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
202B:				
Sauxhead	Poor: depth to rock	Improbable: thin layer	Improbable: thin layer	Poor: small stones too sandy depth to rock
203A:				
Au Gres	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
Deford	Poor: wetness	Probable	Improbable: too sandy	Poor: too sandy wetness
204B:				
Gogebic	Fair: large stones wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim large stones
Tula	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
206B:				
Traunik	Fair: large stones	Probable	Probable	Poor: area reclaim small stones too sandy
207D:				
Dishno	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones
Michigamme	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
Rock outcrop	Poor: depth to rock	Improbable: depth to rock	Improbable: depth to rock	Poor: slope depth to rock

Table 15.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
208F:				
Keewaydin	Poor: slope	Probable	Probable	Poor: area reclaim large stones
Michigamme	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: large stones slope
209B:				
Garlic	Good	Probable	Improbable: too sandy	Poor: too sandy
Fence	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Good
M-W. Miscellaneous water				
W. Water				

Table 16.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
10B:							
Grayling	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
10D:							
Grayling	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
10E:							
Grayling	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
11C:							
Deer Park	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
11D:							
Deer Park	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
12B:							
Rubicon	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
12D:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
12E: Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
12F: Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
13B: Kalkaska	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
13D: Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
13E: Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
13F: Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
14B: Rousseau	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
14D:							
Rousseau	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
15A:							
Croswell	Severe: seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: too acid cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness	Limitation: droughty
16A:							
Paquin	Severe: cemented pan seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: cemented pan cutbanks cave	Limitation: wetness droughty	Limitation: cemented pan too sandy wetness	Limitation: cemented pan rooting depth droughty
17A:							
Au Gres	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness soil blowing	Limitation: wetness droughty
18:							
Kinross	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: ponding cutbanks cave	Limitation: ponding droughty	Limitation: too sandy soil blowing ponding	Limitation: wetness droughty
19:							
Deford	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: ponding cutbanks cave	Limitation: ponding droughty	Limitation: too sandy soil blowing ponding	Limitation: wetness droughty
20B:							
Rousseau	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Ocqueoc	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
20D:							
Rousseau	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Ocqueoc	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
20E:							
Rousseau	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Ocqueoc	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
22B:							
Alcona	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope	Limitation: soil blowing	Favorable
24B:							
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
24D:							
Munising	Severe: slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope wetness
25B:							
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
25B:							
Yalmer	Severe: seepage	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
25D:							
Munising	Severe: slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope wetness
Yalmer	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope wetness
26A:							
Skanee	Moderate: seepage	Severe: piping wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: wetness droughty	Limitation: rooting depth wetness soil blowing	Limitation: rooting depth wetness droughty
27:							
Gay	Moderate: seepage	Severe: ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
28B:							
Keweenaw	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
28D:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
28E:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
29B:							
Yalmer-----------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
29D:							
Yalmer-----------------	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope droughty
31D:							
Trenary----------------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing	Limitation: slope
32A:							
Charlevoix-------------	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: frost action	Limitation: wetness	Limitation: wetness soil blowing	Limitation: wetness
33:							
Ensley-----------------	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
34B:							
Onaway-----------------	Moderate: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
34D:							
Onaway-----------------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing	Limitation: slope
34E:							
Onaway-----------------	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing	Limitation: slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
35B:							
Champion	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness
35D:							
Champion	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope wetness
36A:							
Net	Moderate: seepage	Severe: wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: wetness droughty	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness
37:							
Witbeck	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: large stones ponding	Limitation: large stones ponding	Limitation: large stones wetness droughty
38B:							
Pence	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
38D:							
Pence	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
38E:							
Pence	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
39B:							
Amasa	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily too sandy	Limitation: erodes easily

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
39D: Amasa	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope
39E: Amasa	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope
40B: Waiska	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
40D: Waiska	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
41A: Channing	Severe: seepage	Severe: seepage wetness	Severe: cutbanks cave	Limitation: frost action cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness soil blowing	Limitation: wetness droughty
42: Minocqua	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: frost action ponding cutbanks cave	Limitation: rooting depth ponding	Limitation: erodes easily too sandy ponding	Limitation: erodes easily wetness
43B: Karlin	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
43D:							
Karlin	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
44B:							
Carlshend	Severe: depth to rock	Severe: piping	Severe: no water	Limitation: slope depth to rock	Limitation: slope wetness soil blowing	Limitation: wetness depth to rock	Limitation: wetness depth to rock
45A:							
Zeba	Moderate: seepage depth to rock	Severe: piping wetness	Severe: depth to rock	Limitation: frost action depth to rock	Limitation: wetness depth to rock droughty	Limitation: large stones wetness depth to rock	Limitation: large stones wetness depth to rock
46:							
Jacobsville	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: large stones ponding depth to rock	Limitation: large stones wetness depth to rock
48:							
Burt	Severe: depth to rock	Severe: seepage piping thin layer	Severe: cutbanks cave depth to rock	Limitation: ponding cutbanks cave depth to rock	Limitation: fast intake soil blowing ponding	Limitation: too sandy ponding depth to rock	Limitation: wetness depth to rock droughty
50A:							
Sundell	Moderate: seepage depth to rock	Severe: piping wetness	Severe: depth to rock	Limitation: frost action depth to rock	Limitation: wetness depth to rock	Limitation: wetness depth to rock	Limitation: wetness depth to rock
51:							
Nahma	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
52B:							
Summerville------------	Severe: depth to rock	Severe: piping thin layer	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: soil blowing depth to rock	Limitation: depth to rock droughty
55F:							
Michigamme-------------	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Rock outcrop-----------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
56D:							
Peshekee---------------	Severe: slope depth to rock	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Rock outcrop-----------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
56E:							
Peshekee---------------	Severe: slope depth to rock	Severe: large stones piping thin layer	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Rock outcrop-----------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
56F:							
Peshekee---------------	Severe: slope depth to rock	Severe: large stones piping thin layer	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Rock outcrop-----------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
57:							
Carbondale	Severe: seepage	Severe: excess humus ponding	Severe: slow refill	Limitation: frost action subsides ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
Tawas	Severe: seepage	Severe: seepage piping ponding	Severe: slow refill cutbanks cave	Limitation: frost action subsides ponding	Limitation: soil blowing ponding	Limitation: too sandy soil blowing ponding	Limitation: wetness
58:							
Greenwood	Severe: seepage	Severe: excess humus ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: ponding	Limitation: ponding	Limitation: wetness
Dawson	Severe: seepage	Severe: excess humus ponding	Severe: slow refill cutbanks cave	Limitation: frost action subsides ponding	Limitation: rooting depth ponding	Limitation: ponding	Limitation: wetness
59:							
Chippeny	Moderate: seepage depth to rock	Severe: excess humus ponding	Severe: slow refill depth to rock	Limitation: ponding depth to rock	Limitation: soil blowing ponding	Limitation: soil blowing ponding depth to rock	Limitation: wetness depth to rock
Nahma	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock
60:							
Histosols	Slight	Severe: excess humus ponding	Slight	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
Aquents	Slight	Severe: wetness	Slight	Limitation: frost action	Limitation: wetness	Limitation: wetness	Limitation: wetness
61. Pits, borrow							

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
62B:							
Udorthents.							
Udipsamments-----------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
64.							
Pits and Dumps							
65B.							
Udorthents-Urban land							
66B:							
Udipsamments-----------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Urban land.							
67B:							
Urban land.							
Rubicon----------------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
68:							
Pits, quarries---------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
69B:							
Escanaba---------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
69D:							
Escanaba	Severe: seepage, slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake, slope, droughty	Limitation: slope, too sandy, soil blowing	Limitation: slope, droughty
70B:							
Nadeau	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, too sandy	Limitation: large stones, droughty
70D:							
Nadeau	Severe: seepage, slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones, slope, droughty	Limitation: large stones, slope, too sandy	Limitation: large stones, slope, droughty
71B:							
Evart	Severe: seepage	Severe: seepage, piping, wetness	Severe: cutbanks cave	Limitation: flooding, cutbanks cave	Limitation: wetness, droughty	Limitation: too sandy, wetness	Limitation: wetness, droughty
Pelkie	Severe: seepage	Severe: seepage, piping	Severe: cutbanks cave	Limitation: flooding, cutbanks cave	Limitation: wetness, droughty	Limitation: too sandy, wetness, soil blowing	Limitation: droughty
Sturgeon	Severe: seepage	Severe: seepage, piping, wetness	Severe: cutbanks cave	Limitation: flooding, frost action, cutbanks cave	Limitation: flooding, wetness	Limitation: erodes easily, too sandy, wetness	Limitation: erodes easily, wetness
72B:							
Emmet	Moderate: seepage, slope	Severe: piping	Severe: cutbanks cave	Limitation: deep to water	Limitation: slope, soil blowing	Limitation: soil blowing	Favorable
72D:							
Emmet	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope, soil blowing	Limitation: slope, soil blowing	Limitation: slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
72E:							
Emmet	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing	Limitation: slope
73B:							
Gogebic	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness
73D:							
Gogebic	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope wetness
74D:							
Schweitzer	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones rooting depth slope	Limitation: large stones rooting depth slope
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop.							
74F:							
Schweitzer	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones rooting depth slope	Limitation: large stones rooting depth slope
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop.							

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
76C:							
Garlic	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Alcona	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: soil blowing	Favorable
Voelker	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: slope droughty
76E:							
Garlic	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Alcona	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope soil blowing	Limitation: slope
Voelker	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
76F:							
Garlic	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Alcona	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope soil blowing	Limitation: slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
76F:							
Voelker	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
77D:							
Garlic	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Alcona	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope soil blowing	Limitation: slope
Voelker	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
77E:							
Garlic	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Alcona	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope soil blowing	Limitation: slope
Voelker	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
78C:							
Keweenaw	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
78C:							
Kalkaska	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
78E:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
78F:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
79B:							
Keweenaw	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Munising	Moderate: seepage slope	Severe: seepage piping	Severe: no water	Limitation: percs slowly slope cutbanks cave	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
80B:							
Sayner	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
80B:							
Rubicon	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
80D:							
Sayner	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
80E:							
Sayner	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
81B:							
Pelissier	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
81D:							
Pelissier	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
81E:							
Pelissier	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
84D:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Ishpeming	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
Rock outcrop.							
84F:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Ishpeming	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
Rock outcrop.							
85A:							
Solona	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: frost action	Limitation: wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness
86B:							
Mashek	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope soil blowing	Limitation: wetness soil blowing	Limitation: rooting depth
87B:							
Cunard	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: soil blowing depth to rock	Limitation: depth to rock droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
88:							
Cathro	Severe: seepage	Severe: piping ponding	Severe: slow refill	Limitation: frost action subsides ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
Ensley	Moderate: seepage	Severe: seepage piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
89B:							
Emmet	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
Solona	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: frost action	Limitation: wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness
90B:							
Emmet	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Limitation: rooting depth
Escanaba	Severe: seepage	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
90D:							
Emmet	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing	Limitation: slope
Escanaba	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
91B:							
Onaway	Moderate: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
91B:							
Nadeau	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
92A:							
Ensley	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
Solona	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: frost action	Limitation: wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness
93:							
Tawas	Severe: seepage	Severe: seepage piping ponding	Severe: slow refill cutbanks cave	Limitation: frost action subsides ponding	Limitation: soil blowing ponding	Limitation: too sandy soil blowing ponding	Limitation: wetness
Deford	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: ponding cutbanks cave	Limitation: ponding droughty	Limitation: too sandy soil blowing ponding	Limitation: wetness droughty
94B:							
Keweenaw	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Kalkaska	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
94D:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
94D:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
94E:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
95B:							
Liminga	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
95D:							
Liminga	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
100E:							
Sayner	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
100F:							
Sayner	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
100F:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
103D:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Ocqueoc	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
104C:							
Fence	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: frost action slope cutbanks cave	Limitation: erodes easily slope wetness	Limitation: erodes easily wetness	Limitation: erodes easily
105C:							
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
106B:							
Sagola	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: too sandy soil blowing	Limitation: droughty
Rubicon	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
106D:							
Sagola	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
107B:							
Goodman	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily too sandy	Limitation: erodes easily
Sundog	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily too sandy	Limitation: erodes easily droughty
107D:							
Goodman	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
107F:							
Goodman	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
108B:							
Goodman	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily too sandy	Limitation: erodes easily
Sundog	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily too sandy	Limitation: erodes easily droughty
Wabeno	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily large stones rooting depth	Limitation: erodes easily large stones rooting depth
108D:							
Goodman	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
Wabeno	Severe: slope	Severe: piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: percs slowly slope wetness	Limitation: erodes easily large stones slope	Limitation: erodes easily large stones slope
109B:							
Rubicon	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Keweenaw	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
109D:							
Rubicon----------------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Keweenaw---------------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
109F:							
Rubicon----------------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Keweenaw---------------	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
110B:							
Nadeau-----------------	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
Mancelona--------------	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
110D:							
Nadeau-----------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Mancelona--------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
111B:							
Grayling	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake droughty	Limitation: too sandy soil blowing	Limitation: droughty
112D:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
112F:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
113B:							
Vanriper	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones	Limitation: large stones droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
113D:							
Vanriper	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
113F:							
Vanriper	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
114B:							
Vanriper	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones	Limitation: large stones droughty
114D:							
Vanriper	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
114F:							
Vanriper	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
117B:							
Fence	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: frost action slope cutbanks cave	Limitation: erodes easily slope wetness	Limitation: erodes easily wetness	Limitation: erodes easily
118A:							
Croswell	Severe: seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness	Limitation: droughty
Deford	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: ponding cutbanks cave	Limitation: ponding droughty	Limitation: too sandy soil blowing ponding	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
119B:							
Yalmer	Severe: seepage	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
Kalkaska	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
119D:							
Yalmer	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
121B:							
Onota	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: soil blowing depth to rock	Limitation: depth to rock droughty
122:							
Pleine	Moderate: seepage	Severe: large stones piping ponding	Moderate: large stones slow refill	Limitation: frost action ponding	Limitation: large stones rooting depth ponding	Limitation: large stones ponding	Limitation: large stones wetness
123A:							
Tula	Moderate: seepage	Severe: piping wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: large stones wetness	Limitation: large stones wetness	Limitation: large stones rooting depth wetness
124B:							
Gogebic	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones rooting depth wetness

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
124B:							
Dishno	Moderate: seepage slope depth to rock	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones
124D:							
Gogebic	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope wetness
Dishno	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope
125D:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
125F:							
Keweenaw	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
125F:							
Rock outcrop-----------	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
126B:							
Sundog-----------------	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily too sandy	Limitation: erodes easily droughty
126D:							
Sundog-----------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
126E:							
Sundog-----------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
127B:							
Sundog-----------------	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily too sandy	Limitation: erodes easily droughty
127D:							
Sundog-----------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
127F:							
Sundog-----------------	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
128B:							
Kalkaska---------------	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
128B:							
Waiska	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
128D:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Waiska	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
128E:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Waiska	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
129C:							
Kalkaska	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope cutbanks cave	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
130A:							
Chabeneau	Severe: seepage	Severe: seepage	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: wetness droughty	Limitation: erodes easily too sandy wetness	Limitation: erodes easily droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
131:							
Witbeck	Moderate: seepage	Severe: piping ponding	Severe: slow refill cutbanks cave	Limitation: frost action ponding	Limitation: soil blowing ponding droughty	Limitation: large stones soil blowing ponding	Limitation: large stones wetness
Cathro	Severe: seepage	Severe: piping ponding	Severe: slow refill	Limitation: frost action subsides ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
132. Slickens							
133B:							
Keewaydin	Severe: seepage	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
Dishno	Moderate: seepage slope depth to rock	Severe: large stones piping	Severe: no water	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones
133D:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Dishno	Severe: slope	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope
134B:							
Keewaydin	Severe: seepage	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
134D:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
134F:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
135A:							
Witbeck	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: large stones ponding	Limitation: large stones ponding	Limitation: large stones wetness
Net	Moderate: seepage	Severe: wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: large stones wetness	Limitation: large stones rooting depth wetness	Limitation: large stones wetness droughty
136A:							
Minocqua	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: frost action ponding cutbanks cave	Limitation: rooting depth ponding	Limitation: erodes easily too sandy ponding	Limitation: erodes easily wetness
Channing	Severe: seepage	Severe: seepage wetness	Severe: cutbanks cave	Limitation: frost action cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness soil blowing	Limitation: wetness droughty
137D:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
137F:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
138D:							
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
138F:							
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
139B:							
Sundog	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily too sandy	Limitation: erodes easily droughty
139D:							
Sundog	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily slope too sandy	Limitation: erodes easily slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
140B:							
Champion	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones rooting depth wetness
Dishno	Moderate: seepage slope depth to rock	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones
140D:							
Champion	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope wetness
Dishno	Severe: slope	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope
141D:							
Pelissier	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
142B:							
Pelissier	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
142D:							
Pelissier	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
144B:							
Farquar	Severe: seepage	Severe: seepage	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: wetness droughty	Limitation: large stones too sandy wetness	Limitation: large stones droughty
145C:							
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
Yalmer	Severe: seepage	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth slope droughty
146B:							
Munising	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
Skanee	Moderate: seepage	Severe: piping wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: wetness droughty	Limitation: rooting depth wetness soil blowing	Limitation: rooting depth wetness droughty
147A:							
Skanee	Moderate: seepage	Severe: piping wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: wetness droughty	Limitation: rooting depth wetness soil blowing	Limitation: rooting depth wetness droughty
Gay	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
148B:							
Shoepac	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
148B:							
Ensley	Moderate: seepage	Severe: piping ponding	Moderate: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
149:							
Evart	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: flooding cutbanks cave	Limitation: flooding wetness droughty	Limitation: too sandy wetness	Limitation: wetness droughty
Cathro	Severe: seepage	Severe: piping ponding	Severe: slow refill	Limitation: frost action subsides ponding	Limitation: flooding wetness	Limitation: soil blowing ponding	Limitation: wetness
150:							
Shag	Slight	Severe: piping ponding	Severe: slow refill	Limitation: frost action percs slowly ponding	Limitation: percs slowly soil blowing ponding	Limitation: erodes easily soil blowing ponding	Limitation: erodes easily wetness
151A:							
Spear	Slight	Severe: piping wetness	Severe: slow refill	Limitation: frost action percs slowly	Limitation: wetness soil blowing	Limitation: erodes easily wetness soil blowing	Limitation: erodes easily wetness
153D:							
Ishpeming	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
153F:							
Ishpeming	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
153F:							
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
154B:							
Rubicon	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Sayner	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
154D:							
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Sayner	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
155A:							
Zeba	Moderate: seepage depth to rock	Severe: piping wetness	Severe: depth to rock	Limitation: frost action depth to rock	Limitation: wetness depth to rock droughty	Limitation: large stones wetness depth to rock	Limitation: large stones wetness depth to rock
Jacobsville	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: large stones ponding depth to rock	Limitation: large stones wetness depth to rock
156B:							
Duel	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
157B:							
Reade------------------	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: slope depth to rock	Limitation: slope wetness soil blowing	Limitation: erodes easily wetness depth to rock	Limitation: erodes easily rooting depth depth to rock
Nahma------------------	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock
158C:							
Munising---------------	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
Onota------------------	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: soil blowing depth to rock	Limitation: depth to rock droughty
Yalmer-----------------	Severe: seepage	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness droughty	Limitation: rooting depth wetness	Limitation: rooting depth wetness droughty
159A:							
Jeske------------------	Severe: seepage depth to rock	Severe: seepage piping thin layer	Severe: cutbanks cave depth to rock	Limitation: cutbanks cave depth to rock	Limitation: fast intake wetness droughty	Limitation: too sandy wetness depth to rock	Limitation: wetness depth to rock droughty
160B:							
Paquin-----------------	Severe: cemented pan seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: cemented pan cutbanks cave	Limitation: wetness droughty	Limitation: cemented pan too sandy wetness	Limitation: cemented pan rooting depth droughty
Finch------------------	Severe: cemented pan seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: cemented pan cutbanks cave	Limitation: wetness droughty	Limitation: cemented pan too sandy wetness	Limitation: cemented pan wetness droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
161B:							
Yellowdog	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
162B:							
Buckroe	Severe: depth to rock	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty
165B:							
Chocolay	Moderate: seepage slope depth to rock	Severe: large stones	Severe: no water	Limitation: large stones slope depth to rock	Limitation: large stones slope wetness	Limitation: large stones wetness depth to rock	Limitation: large stones depth to rock droughty
Waiska	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
166:							
Skandia	Severe: seepage	Severe: excess humus ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock
167:							
Skandia	Severe: seepage	Severe: excess humus ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock
Jacobsville	Moderate: seepage depth to rock	Severe: piping ponding	Severe: cutbanks cave depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: large stones ponding depth to rock	Limitation: large stones wetness depth to rock
168B:							
Yellowdog	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy depth to rock	Limitation: depth to rock droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
168B:							
Burt	Severe: depth to rock	Severe: seepage piping thin layer	Severe: cutbanks cave depth to rock	Limitation: ponding depth to rock	Limitation: fast intake soil blowing ponding	Limitation: too sandy ponding depth to rock	Limitation: wetness depth to rock droughty
170B:							
Chocolay	Moderate: seepage slope depth to rock	Severe: large stones seepage	Severe: no water	Limitation: large stones slope depth to rock	Limitation: large stones slope wetness	Limitation: large stones wetness depth to rock	Limitation: large stones depth to rock droughty
171B:							
Paavola	Moderate: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness
172D:							
Buckroe	Severe: slope depth to rock	Severe: seepage thin layer	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
172F:							
Buckroe	Severe: slope depth to rock	Severe: seepage thin layer	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy depth to rock	Limitation: slope depth to rock droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
173B:							
Pence	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: too sandy soil blowing	Limitation: droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
173D:							
Pence	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
174D:							
Yalmer	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope too acid	Limitation: slope wetness droughty	Limitation: rooting depth slope wetness	Limitation: rooting depth slope droughty
Rubicon	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Urban land.							
175E:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Waiska	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: slope droughty
175F:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Waiska	Severe: seepage slope	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: large stones slope too sandy	Limitation: slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
176B:							
Greenwood	Severe: seepage	Severe: excess humus ponding	Severe: slow refill cutbanks cave	Limitation: frost action subsides ponding	Limitation: rooting depth ponding	Limitation: ponding	Limitation: wetness
Croswell	Severe: seepage	Severe: seepage piping	Severe: cutbanks cave	Limitation: slope cutbanks cave	Limitation: slope wetness droughty	Limitation: too sandy wetness	Limitation: droughty
177E:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope	Limitation: rooting depth slope droughty
177F:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope	Limitation: rooting depth slope droughty
178D:							
Schweitzer	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones rooting depth slope	Limitation: large stones rooting depth slope
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
178F:							
Schweitzer	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones rooting depth slope	Limitation: large stones rooting depth slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
178F:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
179E:							
Schweitzer	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones rooting depth slope	Limitation: large stones rooting depth slope
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
180E:							
Kalkaska	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope too sandy soil blowing	Limitation: slope droughty
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope	Limitation: rooting depth slope droughty
180F:							
Kalkaska	Severe: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: slope soil blowing	Limitation: slope droughty
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope	Limitation: rooting depth slope droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--: Pond reservoir areas	Limitations for--: Embankments, dikes, and levees	Limitations for--: Aquifer-fed excavated ponds	Features affecting--: Drainage	Features affecting--: Irrigation	Features affecting--: Terraces and diversions	Features affecting--: Grassed waterways
181E:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope soil blowing	Limitation: rooting depth slope droughty
Tokiahok	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: rooting depth slope too sandy	Limitation: rooting depth slope droughty
181F:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope soil blowing	Limitation: rooting depth slope droughty
Tokiahok	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: rooting depth slope too sandy	Limitation: rooting depth slope droughty
184C:							
Dishno	Moderate: seepage slope depth to rock	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones wetness	Limitation: large stones
Witbeck	Moderate: seepage	Severe: piping ponding	Severe: slow refill	Limitation: frost action ponding	Limitation: large stones soil blowing ponding	Limitation: large stones soil blowing ponding	Limitation: large stones wetness
Rock outcrop.							
185B:							
Northland	Severe: seepage	Severe: seepage	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
187B:							
Reade	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: depth to rock	Limitation: wetness soil blowing	Limitation: erodes easily wetness depth to rock	Limitation: erodes easily rooting depth depth to rock
190B:							
Emmet	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
Cunard	Moderate: seepage slope depth to rock	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing droughty	Limitation: soil blowing depth to rock	Limitation: depth to rock droughty
191B:							
Nahma	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: ponding depth to rock	Limitation: wetness depth to rock
Sundell	Moderate: seepage depth to rock	Severe: piping wetness	Severe: depth to rock	Limitation: frost action depth to rock	Limitation: wetness depth to rock	Limitation: wetness depth to rock	Limitation: wetness depth to rock
193E:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: rooting depth slope	Limitation: rooting depth slope droughty
Tokiahok	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: rooting depth slope too sandy	Limitation: rooting depth slope droughty
194E:							
Sporley	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: erodes easily slope	Limitation: erodes easily slope	Limitation: erodes easily slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
196E:							
Frohling	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope droughty	Limitation: slope soil blowing	Limitation: rooting depth slope droughty
Onota	Severe: slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope soil blowing depth to rock	Limitation: slope depth to rock droughty
Tokiahok	Severe: seepage slope	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: rooting depth slope too sandy	Limitation: rooting depth slope droughty
197B:							
Shoepac	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: slope wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness
Trenary	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: deep to water	Limitation: slope soil blowing	Limitation: soil blowing	Favorable
198B:							
Shoepac	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: percs slowly slope	Limitation: wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness
Reade	Moderate: seepage depth to rock	Severe: piping	Severe: no water	Limitation: depth to rock	Limitation: wetness soil blowing	Limitation: erodes easily wetness depth to rock	Limitation: erodes easily rooting depth depth to rock
199. Udorthents, ash							
200A:							
Charlevoix	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Limitation: frost action	Limitation: wetness soil blowing	Limitation: wetness soil blowing	Limitation: wetness

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
200A:							
Ensley	Moderate: seepage	Severe: piping ponding	Severe: slow refill	Limitation: frost action ponding	Limitation: soil blowing ponding	Limitation: soil blowing ponding	Limitation: wetness
201B:							
Sauxhead	Severe: depth to rock	Severe: seepage thin layer	Severe: no water	Limitation: slope cutbanks cave depth to rock	Limitation: slope wetness droughty	Limitation: too sandy wetness depth to rock	Limitation: depth to rock droughty
Jacobsville	Moderate: seepage depth to rock	Severe: piping ponding	Severe: depth to rock	Limitation: frost action ponding depth to rock	Limitation: soil blowing ponding depth to rock	Limitation: large stones ponding depth to rock	Limitation: large stones wetness depth to rock
202B:							
Sauxhead	Severe: depth to rock	Severe: seepage thin layer	Severe: no water	Limitation: slope cutbanks cave depth to rock	Limitation: slope wetness droughty	Limitation: too sandy wetness depth to rock	Limitation: depth to rock droughty
203A:							
Au Gres	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Limitation: cutbanks cave	Limitation: wetness droughty	Limitation: too sandy wetness soil blowing	Limitation: wetness droughty
Deford	Severe: seepage	Severe: seepage piping ponding	Severe: cutbanks cave	Limitation: ponding cutbanks cave	Limitation: ponding droughty	Limitation: too sandy soil blowing ponding	Limitation: wetness droughty
204B:							
Gogebic	Moderate: seepage slope	Severe: large stones piping	Severe: no water	Limitation: large stones percs slowly slope	Limitation: large stones slope wetness	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness
Tula	Moderate: seepage	Severe: piping wetness	Severe: no water	Limitation: frost action percs slowly	Limitation: large stones wetness	Limitation: large stones rooting depth wetness	Limitation: large stones rooting depth wetness

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
206B:							
Traunik	Severe: seepage	Severe: seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones too sandy	Limitation: large stones droughty
207D:							
Dishno	Severe: slope	Severe: large stones piping	Moderate: deep to water depth to rock	Limitation: large stones slope	Limitation: large stones slope wetness	Limitation: large stones slope wetness	Limitation: large stones slope
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop	Severe: slope depth to rock	Slight	Severe: no water	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
208F:							
Keewaydin	Severe: seepage slope	Severe: large stones seepage	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
Michigamme	Severe: slope	Severe: large stones piping	Severe: no water	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
209B:							
Garlic	Severe: seepage	Severe: seepage piping	Severe: no water	Limitation: deep to water	Limitation: fast intake slope droughty	Limitation: too sandy soil blowing	Limitation: droughty
Fence	Moderate: seepage slope	Severe: piping	Severe: no water	Limitation: frost action slope cutbanks cave	Limitation: erodes easily slope wetness	Limitation: erodes easily wetness	Limitation: erodes easily

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
M-W. Miscellaneous water							
W. Water							

Table 17.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
10B:												
Grayling--------	0-3	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	3-23	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	23-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
10D:												
Grayling--------	0-3	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	3-23	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	23-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
10E:												
Grayling--------	0-3	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	3-23	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	23-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
11C:												
Deer Park-------	0-3	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
	3-11	Sand	SP-SM, SP	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
	11-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
11D:												
Deer Park-------	0-3	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
	3-11	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
	11-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	100	50-70	0-15	---	NP
12B:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
12D:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
12E:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
12F:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
13B:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
13D:												
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
13E:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
13F:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
14B:												
Rousseau--------	0-6	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	6-27	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	27-80	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
14D:												
Rousseau--------	0-6	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	6-27	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	27-80	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
15A:												
Croswell--------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-34	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-75	0-15	---	NP
	34-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
16A:												
Paquin----------	0-11	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	11-12	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	12-14	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	14-36	Sand, fine sand	SP-SM, SP, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	36-80	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
17A:												
Au Gres---------	0-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-70	0-15	---	NP
	8-27	Sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-75	0-30	---	NP
	27-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-70	0-15	---	NP
18:												
Kinross---------	0-5	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	5-30	Sand, fine sand, loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	30-80	Sand, fine sand	SM, SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
19:												
Deford----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-80	Sand, loamy sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-75	0-30	---	NP
20B:												
Rousseau--------	0-6	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	6-27	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	27-80	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
Ocqueoc---------	0-2	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	2-7	Sand, fine sand	SM, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-95	5-35	---	NP
	7-27	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	27-80	Stratified silt loam to fine sand	CL-ML, ML, SM	A-2-4, A-4	0	0	100	100	75-100	30-90	0-25	NP-7
20D:												
Rousseau--------	0-6	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	6-27	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	27-80	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
20D:												
Ocqueoc---------	0-2	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	2-7	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	7-27	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	27-80	Stratified silt loam to fine sand	CL-ML, ML, SM	A-2-4, A-4	0	0	100	100	75-100	30-90	0-25	NP-7
20E:												
Rousseau--------	0-6	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	6-27	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
	27-80	Fine sand	SM	A-2-4	0	0	100	100	75-95	20-35	---	NP
Ocqueoc---------	0-2	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	2-7	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	7-27	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	27-80	Stratified silt loam to fine sand	CL-ML, ML, SM	A-2-4, A-4	0	0	100	100	75-100	30-90	0-25	NP-7
22B:												
Alcona----------	0-9	Loamy very fine sand	SM, ML	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-2-4, A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
24B:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
24D:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
25B:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
25B:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-5	90-100	85-100	45-95	20-55	0-25	NP-7
25D:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SM, SC-SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SP-SM, SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-25	NP-7
26A:												
Skanee----------	0-7	Cobbly fine sandy loam	SM	A-4	0-3	10-20	85-100	80-95	50-80	30-50	0-20	NP-4
	7-12	Fine sandy loam, cobbly sandy loam, sandy loam	SM	A-2-4, A-4	0-3	3-20	85-100	80-100	50-80	25-50	0-20	NP-4
	12-30	Sandy loam, loamy sand, sandy clay loam	SC-SM, SM, SC	A-2-4, A-4, A-6	0-3	0-8	90-100	85-100	40-95	10-55	20-35	NP-15
	30-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
27:												
Gay-------------	0-2	Muck	PT	A-8	---	---	---	---	---	---	---	---
	2-18	Gravelly loamy sand, fine sandy loam, cobbly sandy loam	SM	A-2-4, A-4	0-8	0-15	80-100	75-100	35-85	10-50	0-25	NP-7
	18-31	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-25	NP-7
	31-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-25	NP-7
28B:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SP-SM, SM	A-2-4, A-4, A-3	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SC-SM, SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
28D:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-2-4, A-4, A-3	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SC-SM, SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
28E:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SP-SM, SM	A-2-4, A-4, A-3	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SP-SM, SM, SC-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
29B:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-25	NP-7
29D:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-25	NP-7
31D:												
Trenary---------	0-5	Silt loam	ML	A-4	0-3	0-8	90-100	85-100	80-100	65-90	0-20	NP-4
	5-15	Very fine sandy loam, fine sandy loam, sandy loam	ML, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	55-95	25-65	0-20	NP-4
	15-48	Loamy fine sand, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	40-80	10-50	20-30	NP-11
	48-80	Cobbly fine sandy loam, gravelly fine sandy loam, fine sandy loam	SM, SC-SM	A-4	0-3	0-20	70-95	65-90	50-80	30-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
32A:												
Charlevoix------	0-8	Silt loam	ML	A-4	0-3	0-8	90-100	85-100	75-100	55-90	0-20	NP-4
	8-12	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-3	0-8	90-100	85-100	55-95	30-65	0-20	NP-4
	12-28	Fine sandy loam, sandy clay loam	SC, SM, SC-SM	A-2-6, A-4	0-3	0-8	90-100	85-100	55-90	30-55	20-35	NP-15
	28-80	Gravelly fine sandy loam, cobbly fine sandy loam	SM, SC-SM	A-4	0-3	0-15	75-100	70-100	45-80	25-50	0-20	NP-4
33:												
Ensley----------	0-5	Muck	PT	A-8	---	---	---	---	---	---	---	---
	5-19	Sandy loam, fine sandy loam, loam	SM, ML	A-2-4, A-4	0-3	0-8	90-100	85-100	50-95	25-75	0-25	NP-7
	19-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-3	0-15	65-90	60-85	45-75	25-50	0-20	NP-4
34B:												
Onaway----------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	6-13	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	13-18	Loam, sandy clay loam	CL-ML	A-4, A-6	0-3	0-8	90-100	85-100	65-95	30-75	10-30	4-18
	18-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-3	3-15	70-95	65-90	45-75	25-50	0-20	NP-4
34D:												
Onaway----------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	6-13	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	13-18	Loam, sandy clay loam	CL-ML	A-4, A-6	0-3	0-8	90-100	85-100	65-95	30-75	10-30	4-18
	18-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-3	3-15	70-95	65-90	45-75	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
34E:												
Onaway----------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	6-13	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	13-18	Loam, sandy clay loam	CL-ML	A-4, A-6	0-3	0-8	90-100	85-100	65-95	30-75	10-30	4-18
	18-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-3	3-15	70-95	65-90	45-75	25-50	0-20	NP-4
35B:												
Champion--------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-20	85-100	80-95	55-85	30-50	0-20	NP-4
	5-26	Cobbly fine sandy loam, very fine sandy loam, fine sandy loam	ML, SM	A-4, A-2-4	0-8	0-20	85-100	80-95	55-95	30-65	0-20	NP-4
	26-43	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
	43-80	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
35D:												
Champion--------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-20	85-100	80-95	55-85	30-50	0-20	NP-4
	5-26	Cobbly fine sandy loam, very fine sandy loam, fine sandy loam	ML, SM	A-4, A-2-4	0-8	0-20	85-100	80-95	55-95	30-65	0-20	NP-4
	26-43	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
	43-80	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
36A:												
Net-------------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	0-15	15-30	90-100	85-95	70-90	40-60	0-20	NP-4
	5-18	Cobbly very fine sandy loam, silt loam, gravelly very fine sandy loam	SM, ML	A-4	0-15	0-30	90-100	85-100	70-95	40-85	0-20	NP-4
	18-45	Gravelly sandy loam, gravelly loamy sand, gravelly fine sandy loam	SC-SM, SM	A-2-4, A-4	0-10	0-15	75-90	70-85	30-75	10-50	0-20	NP-4
	45-80	Gravelly sandy loam, gravelly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	0-10	0-15	75-90	70-85	30-75	10-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
37:												
Witbeck---------	0-8	Very stony muck	PT	A-8	15-25	8-25	---	---	---	---	---	---
	8-15	Very stony very fine sandy loam, very stony sandy loam	SM, ML	A-4, A-2-4	15-25	8-25	80-100	75-95	50-95	25-65	0-20	NP-4
	15-22	Very stony fine sandy loam, stony very fine sandy loam	ML, SM	A-2-4, A-4	15-25	8-20	80-100	75-95	55-95	30-65	0-20	NP-4
	22-80	Gravelly sandy loam, gravelly loamy sand	SM	A-2-4	0-8	0-15	75-85	70-80	30-60	10-35	0-20	NP-4
38B:												
Pence-----------	0-6	Fine sandy loam	SM	A-4	0	0-8	90-100	85-95	55-85	30-50	0-20	NP-4
	6-13	Gravelly sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-8	65-100	60-95	40-85	20-50	0-20	NP-4
	13-31	Gravelly coarse sand, loamy sand, coarse sand	SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0-8	65-95	60-90	20-70	0-30	---	NP
	31-80	Stratified very gravelly coarse sand to sand	GP, SP-SM, SP, GP-GM	A-1, A-3	0	0-8	45-95	40-90	10-65	0-15	---	NP
38D:												
Pence-----------	0-6	Fine sandy loam	SM	A-4	0	0-8	90-100	85-95	55-85	30-50	0-20	NP-4
	6-13	Gravelly sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-8	65-100	60-95	40-85	20-50	0-20	NP-4
	13-31	Gravelly coarse sand, loamy sand, coarse sand	SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0-8	65-95	60-90	20-70	0-30	---	NP
	31-80	Stratified very gravelly coarse sand to sand	GP, SP-SM, SP, GP-GM	A-3, A-1	0	0-8	45-95	40-90	10-65	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
38E:												
Pence-----------	0-6	Fine sandy loam	SM	A-4	0	0-8	90-100	85-95	55-85	30-50	0-20	NP-4
	6-13	Gravelly sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-8	65-100	60-95	40-85	20-50	0-20	NP-4
	13-31	Gravelly coarse sand, loamy sand, coarse sand	SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0-8	65-95	60-90	20-70	0-30	---	NP
	31-80	Stratified, very gravelly coarse sand, sand	GP, SP-SM, SP, GP-GM	A-1, A-3	0	0-8	45-95	40-90	10-65	0-15	---	NP
39B:												
Amasa-----------	0-5	Very fine sandy loam	ML, SM	A-4	0-3	0-8	95-100	90-100	75-95	45-65	0-20	NP-4
	5-16	Very fine sandy loam, gravelly fine sandy loam, sandy loam	ML, SM	A-2-4, A-4	0-3	0-8	75-100	70-100	45-95	25-65	0-20	NP-4
	16-80	Very gravelly sand, gravelly sand, sand	GP-GM, GP, SP, SP-SM	A-1, A-3	0-8	0-15	45-90	40-85	10-55	0-15	---	NP
39D:												
Amasa-----------	0-5	Very fine sandy loam	ML, SM	A-4	0-3	0-8	95-100	90-100	75-95	45-65	0-20	NP-4
	5-16	Very fine sandy loam, gravelly fine sandy loam, sandy loam	ML, SM	A-2-4, A-4	0-3	0-8	75-100	70-100	45-95	25-65	0-20	NP-4
	16-80	Very gravelly sand, gravelly sand, sand	GP-GM, GP, SP, SP-SM	A-1, A-3	0-8	0-15	45-90	40-85	10-55	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
39E:												
Amasa-----------	0-5	Very fine sandy loam	ML, SM	A-4	0-3	0-8	95-100	90-100	75-95	45-65	0-20	NP-4
	5-16	Very fine sandy loam, gravelly fine sandy loam, sandy loam	ML, SM	A-2-4, A-4	0-3	0-8	75-100	70-100	45-95	25-65	0-20	NP-4
	16-80	Very gravelly sand, gravelly sand, sand	GP-GM, GP, SP, SP-SM	A-1, A-3	0-8	0-15	45-90	40-85	10-55	0-15	---	NP
40B:												
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly loamy sand, very gravelly coarse sand	GW, SM, SW	A-1, A-2-4, A-3	0	0-30	40-60	35-55	10-51	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	SW, GW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
40D:												
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly loamy sand, very gravelly coarse sand	GW, SW	A-1, A-2-4	0	0-30	40-60	35-55	10-45	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	SW, GW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
41A:												
Channing--------	0-9	Fine sandy loam	SM	A-4	0	0-5	90-100	85-100	55-85	30-50	0-20	NP-4
	9-22	Very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	90-100	85-100	55-95	30-65	0-20	NP-4
	22-80	Stratified sand to very gravelly sand	SP, SP-SM, GP, GP-GM	A-1, A-3	0	0-15	40-80	35-75	10-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
42:												
Minocqua--------	0-5	Muck	PT	A-8	0	0	---	---	---	---	---	---
	5-23	Fine sandy loam, sandy loam, silt loam	ML, SM	A-2-4, A-4	0	0	90-100	85-100	50-100	25-90	0-25	NP-7
	23-80	Very gravelly sand, gravelly coarse sand, sand	GP-GM, SP, GP, SP-SM	A-1, A-3	0	0	40-95	35-90	5-65	0-15	---	NP
43B:												
Karlin----------	0-4	Sandy loam	SM	A-2-4	0	0-3	95-100	90-100	55-70	25-40	0-20	NP-4
	4-15	Loamy fine sand, fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-3	95-100	90-100	55-95	25-50	0-20	NP-4
	15-29	Loamy sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0-3	95-100	90-100	40-75	0-30	---	NP
	29-80	Sand	SP, SP-SM	A-2-4, A-3	0	0-3	95-100	90-100	40-70	0-15	---	NP
43D:												
Karlin----------	0-4	Sandy loam	SM	A-2-4	0	0-3	95-100	90-100	55-70	25-40	0-20	NP-4
	4-15	Loamy fine sand, fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-3	95-100	90-100	55-95	25-50	0-20	NP-4
	15-29	Loamy sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0-3	95-100	90-100	40-75	0-30	---	NP
	29-80	Sand	SP, SP-SM	A-2-4, A-3	0	0-3	95-100	90-100	40-70	0-15	---	NP
44B:												
Carlshend-------	0-3	Fine sandy loam	SM	A-4	0	0-3	95-100	90-100	65-85	35-50	0-20	NP-4
	3-14	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-3	95-100	90-100	55-70	25-40	0-20	NP-4
	14-25	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
	25-35	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
45A:												
Zeba------------	0-14	Cobbly fine sandy loam	SM	A-4	0	15-30	75-95	70-90	55-80	30-50	0-20	NP-4
	14-31	Fine sandy loam, sandy loam, loamy sand	SM	A-4, A-2-4	0	0-15	85-100	80-100	40-80	15-50	0-25	NP-7
	31-41	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
46:												
Jacobsville-----	0-4	Muck	PT	A-8	0-5	0	---	---	---	---	---	---
	4-9	Loam, gravelly sandy loam, fine sandy loam	SM, ML	A-2-4, A-4	0-5	0-15	80-100	75-95	45-95	20-75	0-20	NP-4
	9-16	Sandy loam, fine sandy loam, gravelly sandy loam	SM	A-2-4, A-4	0-3	0-15	80-100	75-95	45-85	20-50	0-25	NP-7
	16-28	Sandy loam, gravelly sandy loam	SM	A-2-4	0-3	0-5	90-100	85-95	45-70	20-40	0-25	NP-7
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
48:												
Burt------------	0-7	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	7-18	Sand, gravelly sand	SP, SP-SM	A-1-b, A-3	0	0-8	70-95	65-90	35-65	0-15	---	NP
	18-28	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
50A:												
Sundell---------	0-8	Loam	ML	A-4	0-2	0-8	95-100	90-100	75-95	55-75	0-20	NP-4
	8-17	Sandy loam, loam, fine sandy loam	SM, ML	A-4	0-2	0-8	95-100	90-100	50-85	35-70	0-20	NP-4
	17-22	Gravelly fine sandy loam, fine sandy loam	SC-SM, SM	A-4	0-5	0-10	70-80	65-75	45-75	25-50	0-20	NP-4
	22-40	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
51:												
Nahma-----------	0-11	Muck	PT	A-8	0	0	---	---	---	---	---	---
	11-14	Mucky loam	ML	A-4	0	0-5	90-100	85-100	70-95	50-75	20-30	NP-9
	14-24	Sandy loam, loam, gravelly fine sandy loam	ML, SM	A-2-4, A-4	2-5	0-10	80-100	75-100	50-95	25-75	20-30	NP-9
	24-34	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
52B:												
Summerville-----	0-5	Fine sandy loam	SM	A-4	0	0-3	95-100	90-100	65-85	35-50	0-20	NP-4
	5-13	Fine sandy loam, channery fine sandy loam	SM	A-4	0-10	0-10	85-100	80-100	55-85	30-50	0-20	NP-4
	13-23	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
55F:												
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-30	85-100	80-95	55-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
56D:												
Peshekee--------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	0-15	15-30	85-95	80-95	65-95	35-60	0-20	NP-4
	5-14	Cobbly very fine sandy loam, fine sandy loam, cobbly sandy loam	SM, ML	A-2-4, A-4	0-15	0-15	85-100	80-95	50-95	20-55	0-20	NP-4
	14-24	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
56E:												
Peshekee--------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	0-15	15-30	85-95	80-95	65-95	40-60	0-20	NP-4
	5-14	Cobbly very fine sandy loam, fine sandy loam, cobbly sandy loam	SM, ML	A-2-4, A-4	0-15	0-15	85-100	80-95	50-95	25-65	0-20	NP-4
	14-24	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
56F:												
Peshekee--------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	0-15	15-30	85-95	80-95	65-95	40-60	0-20	NP-4
	5-14	Cobbly very fine sandy loam, fine sandy loam, cobbly sandy loam	ML, SM	A-2-4, A-4	0-15	0-15	85-100	80-95	50-95	25-65	0-20	NP-4
	14-24	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
56F:												
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
57:												
Carbondale------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-38	Muck	PT	A-8	0	0	---	---	---	---	---	---
	38-80	Mucky peat	PT	A-8	0	0	---	---	---	---	---	---
Tawas-----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-25	Muck	PT	A-8	0	0	---	---	---	---	---	---
	25-80	Sand, fine sand, loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0	90-100	85-100	40-95	0-30	---	NP
58:												
Greenwood-------	0-8	Peat	PT	A-8	0	0	---	---	---	---	---	---
	8-80	Mucky peat	PT	A-8	0	0	---	---	---	---	---	---
Dawson----------	0-6	Peat	PT	A-8	0	0	---	---	---	---	---	---
	6-34	Muck	PT	A-8	0	0	---	---	---	---	---	---
	34-36	Sand, mucky sand, fine sand	SP, SP-SM, SM	A-3, A-2-4	0	0	100	100	50-95	0-35	---	NP
	36-80	Sand, loamy fine sand, fine sand	SM, SP-SM, SP	A-2-4, A-3	0	0	100	100	50-95	0-50	---	NP
59:												
Chippeny--------	0-29	Muck	PT	A-8	---	---	---	---	---	---	---	---
	29-38	Silt loam, gravelly fine sandy loam	ML, SM	A-4	0-5	0-10	80-100	75-100	50-100	30-90	0-20	NP-4
	38-48	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Nahma-----------	0-11	Muck	PT	A-8	0	0	---	---	---	---	---	---
	11-14	Mucky loam	ML	A-4	0	0-5	90-100	85-100	70-95	50-75	20-30	NP-4
	14-24	Sandy loam, loam, gravelly fine sandy loam	SM, ML	A-2-4, A-4	2-5	0-10	80-100	75-100	50-95	25-75	20-30	NP-4
	24-34	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
60:												
Histosols-------	0-51	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	51-80	Variable	---	---	---	---	---	---	---	---	---	---
Aquents---------	0-80	Variable	---	---	---	---	---	---	---	---	---	---
61. Pits, borrow												
62B:												
Udorthents------	0-60	Gravelly sandy loam, fine sandy loam	SM	A-4, A-2-4	0-5	0-10	75-100	70-100	50-85	15-45	0-30	NP-9
	60-80	Variable	---	---	---	---	---	---	---	---	---	---
Udipsamments----	0-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
64. Pits and Dumps												
65B:												
Udorthents------	0-60	Gravelly sandy loam, fine sandy loam	SM	A-4, A-2-4	0-5	0-10	75-100	70-100	50-85	15-45	0-30	NP-9
	60-80	Variable	---	---	---	---	---	---	---	---	---	---
Urban land.												
66B:												
Udipsamments----	0-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Urban land.												
67B:												
Urban land.												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
68:												
Pits, quarries--	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
69B:												
Escanaba--------	0-6	Loamy fine sand	SM	A-4	0	0-3	95-100	90-100	75-95	30-50	---	NP
	6-26	Loamy fine sand, fine sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0	0-3	95-100	90-100	40-95	5-50	---	NP
	26-35	Loamy sand, fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0	0-8	95-100	90-100	40-95	10-50	0-20	NP-4
	35-42	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	95-100	90-100	50-95	25-50	0-25	NP-7
	42-80	Gravelly fine sandy loam, sandy loam	SM, SC-SM	A-2-4, A-4	0	0-15	70-100	65-95	50-75	25-50	0-20	NP-4
69D:												
Escanaba--------	0-6	Loamy fine sand	SM	A-4	0	0-3	95-100	90-100	75-95	30-50	---	NP
	6-26	Loamy fine sand, fine sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0	0-3	95-100	90-100	40-95	5-50	---	NP
	26-35	Loamy sand, fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0	0-8	95-100	90-100	40-95	10-50	0-20	NP-4
	35-42	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	95-100	90-100	50-95	25-50	0-25	NP-7
	42-80	Gravelly fine sandy loam, sandy loam	SM, SC-SM	A-2-4, A-4	0	0-15	70-100	65-95	50-75	25-50	0-20	NP-4
70B:												
Nadeau----------	0-7	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	50-85	30-50	0-25	NP-7
	7-17	Gravelly fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-10	70-95	65-90	45-70	20-45	0-25	NP-7
	17-23	Very gravelly sandy loam, very gravelly fine sandy loam	SM, GM	A-1, A-2-4, A-4	0	10-30	40-55	35-50	25-45	5-36	20-30	NP-4
	23-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	10-30	40-55	35-50	5-40	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
70D:												
Nadeau----------	0-7	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	50-85	30-50	0-25	NP-7
	7-17	Gravelly fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-10	70-95	65-90	45-70	20-45	0-25	NP-7
	17-23	Very gravelly sandy loam, very gravelly fine sandy loam	GM, SM	A-2-4, A-4, A-1	0	10-30	40-55	35-50	25-45	5-36	20-30	NP-4
	23-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	10-30	40-55	35-50	5-40	0-10	---	NP
71B:												
Evart-----------	0-10	Silt loam	ML	A-4	0	0	100	95-100	90-100	70-90	0-20	NP-4
	10-80	Fine sand, sand, loamy sand	SP-SM, SP, SM	A-2-4, A-3	0	0	90-100	85-100	40-95	0-35	---	NP
Pelkie----------	0-7	Loamy fine sand	SM	A-4	0	0	100	100	90-95	40-50	---	NP
	7-80	Sand, fine sand, loamy fine sand	SM, SP-SM, SP	A-4, A-3, A-2-4	0	0	100	100	50-95	0-50	---	NP
Sturgeon--------	0-6	Very fine sandy loam	ML	A-4	0	0	100	100	85-95	70-80	0-20	NP-4
	6-35	Stratified loamy very fine sand, very fine sandy loam, silt loam	ML	A-4	0	0	100	100	75-100	60-90	0-20	NP-4
	35-80	Sand, fine sand	SM, SP-SM, SP	A-3, A-2-4	0	0	100	100	50-95	0-35	---	NP
72B:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
72D:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4
72E:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4
73B:												
Gogebic---------	0-5	Cobbly silt loam	ML	A-4	5-10	10-20	75-95	70-90	65-90	55-85	0-20	NP-4
	5-18	Cobbly sandy loam, very fine sandy loam, cobbly fine sandy loam	ML, SM	A-2-4, A-4	0-10	1-20	75-100	70-95	50-90	25-60	0-20	NP-4
	18-62	Very gravelly loamy sand, cobbly sandy loam, very gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	30-60	10-40	0-25	NP-7
	62-80	Gravelly sandy loam, very gravelly sandy loam	SM	A-2-4	0-15	8-30	50-70	45-65	35-60	10-30	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
73D:												
Gogebic---------	0-5	Cobbly silt loam	ML	A-4	5-10	10-20	75-95	70-90	65-90	55-85	0-20	NP-4
	5-18	Cobbly sandy loam, very fine sandy loam, cobbly fine sandy loam	ML, SM	A-2-4, A-4	0-10	1-20	75-100	70-95	50-90	25-60	0-20	NP-4
	18-62	Very gravelly loamy sand, cobbly sandy loam, very gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	30-60	10-40	0-25	NP-7
	62-80	Very gravelly sandy loam, gravelly sandy loam	SM	A-2-4	0-15	8-30	50-70	45-65	35-60	10-30	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
74D:												
Schweitzer------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-95	70-95	40-65	0-20	NP-4
	5-21	Cobbly very fine sandy loam, cobbly silt loam, fine sandy loam	SM, ML	A-4	2-15	10-30	80-95	75-90	55-90	30-80	0-20	NP-4
	21-43	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-20	NP-4
	43-61	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-25	NP-7
	61-80	Very cobbly loamy sand, very gravelly loamy sand, cobbly sandy loam	SM	A-1-b, A-2-4	2-15	5-35	50-75	45-70	30-70	5-45	0-20	NP-4
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
74D:												
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
74F:												
Schweitzer------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-95	70-95	40-65	0-20	NP-4
	5-21	Cobbly very fine sandy loam, cobbly silt loam, fine sandy loam	SM, ML	A-4	2-15	10-30	80-95	75-90	55-90	30-80	0-20	NP-4
	21-43	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-20	NP-4
	43-61	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-25	NP-7
	61-80	Very cobbly loamy sand, very gravelly loamy sand, cobbly sandy loam	SM	A-1-b, A-2-4	2-15	5-35	50-75	45-70	30-70	5-45	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
74F:												
Michigamme------	0-5	Cobbly very fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
76C:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Alcona----------	0-9	Loamy very fine sand	SM	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-2-4, A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
76C:												
Voelker---------	0-11	Fine sand	SM	A-2-4	0	0	100	95-100	75-90	20-35	0-20	NP-4
	11-15	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	15-31	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	31-39	Loamy very fine sand, fine sandy loam, very fine sandy loam	SC-SM, SM, ML	A-4	0	0	100	95-100	70-95	40-65	0-20	NP-4
	39-80	Stratified silt loam to fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	75-100	20-90	0-25	NP-7
76E:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Alcona----------	0-9	Loamy very fine sand	SM	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
76E:												
Voelker----------	0-11	Fine sand	SM	A-2-4	0	0	100	95-100	75-90	20-35	0-20	NP-4
	11-15	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	15-31	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	31-39	Loamy very fine sand, fine sandy loam, very fine sandy loam	SC-SM, SM, ML	A-4	0	0	100	95-100	70-95	40-65	0-20	NP-4
	39-80	Stratified silt loam to fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	75-100	20-90	0-25	NP-7
76F:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Alcona----------	0-9	Loamy very fine sand	SM	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-2-4, A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
76F:												
Voelker---------	0-11	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	0-20	NP-4
	11-15	Sand, fine sand, loamy fine sand	SP-SM, SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	15-31	Sand, fine sand, loamy fine sand	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	31-39	Loamy very fine sand, fine sandy loam, very fine sandy loam	SC-SM, SM, ML	A-4	0	0	100	95-100	70-95	40-65	0-20	NP-4
	39-80	Stratified silt loam to fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	75-100	20-90	0-25	NP-7
77D:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Alcona----------	0-9	Loamy very fine sand	SM	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-2-4, A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
77D:												
Voelker---------	0-11	Fine sand	SM	A-2-4	0	0	100	95-100	75-90	20-35	0-20	NP-4
	11-15	Sand, fine sand, loamy fine sand	SP-SM, SM	A-4, A-3, A-2-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	15-31	Sand, fine sand, loamy fine sand	SM, SP-SM	A-4, A-3, A-2-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	31-39	Loamy very fine sand, fine sandy loam, very fine sandy loam	ML, SC-SM, SM	A-4	0	0	100	95-100	70-95	40-65	0-20	NP-4
	39-80	Stratified silt loam to fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	75-100	20-90	0-25	NP-7
77E:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Alcona----------	0-9	Loamy very fine sand	SM	A-4	0	0-5	95-100	90-100	55-95	35-60	0-20	NP-4
	9-13	Loamy fine sand, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	13-26	Loamy fine sand, fine sandy loam, very fine sandy loam	ML, SM	A-4	0	0-5	95-100	90-100	65-95	35-65	0-20	NP-4
	26-49	Fine sandy loam, silt loam, loamy sand	CL-ML, SM, ML	A-2-4, A-4	0	0-5	95-100	90-100	45-100	10-90	20-30	NP-10
	49-80	Stratified fine sand to silt loam	ML, SM	A-2-4, A-4	0	0-5	95-100	90-100	70-100	15-90	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
77E:												
Voelker---------	0-11	Fine sand	SM	A-2-4	0	0	100	95-100	75-90	20-35	0-20	NP-4
	11-15	Sand, fine sand, loamy fine sand	SP-SM, SM	A-4, A-3, A-2-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	15-31	Sand, fine sand, loamy fine sand	SM, SP-SM	A-4, A-3, A-2-4	0	0	100	95-100	50-95	5-50	0-20	NP-4
	31-39	Loamy very fine sand, fine sandy loam, very fine sandy loam	SC-SM, SM, ML	A-4	0	0	100	95-100	70-95	40-65	0-20	NP-4
	39-80	Stratified silt loam to fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	75-100	20-90	0-25	NP-7
78C:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-3, A-2-4, A-4	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SM, SC-SM, SP-SM	A-4, A-3, A-2-4	0-3	0-5	90-100	85-100	40-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
78E:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-2-4, A-3	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SM, SC-SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
78F:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-2-4, A-3	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SC-SM, SP-SM, SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	40-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
79B:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-3, A-2-4	0-3	0-5	90-100	85-100	40-95	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SM, SC-SM, SP-SM	A-4, A-3, A-2-4	0-3	0-5	90-100	85-100	40-85	5-50	0-20	NP-4
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SM, SC-SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
80B:												
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP-SM, SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP-SM, SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
80B:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
80D:												
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SM, SP-SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
Rubicon---------	0-7	Sand	SP-SM, SP	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
80E:												
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP-SM, SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP-SM, SP, SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
81B:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	---	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SM, SP, SP-SM	A-2-4, A-3	0-3	0-20	65-80	60-75	30-60	0-35	---	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	GP-GM, SP, SM, SP-SM	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP
81D:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	0-20	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SP, SP-SM, SM	A-2-4, A-3	0-3	0-20	65-80	60-75	30-60	0-35	0-20	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	SM, GP-GM, SP-SM, SP	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
81E:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	0-20	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SP, SP-SM, SM	A-2-4, A-3	0-3	0-20	65-80	60-75	30-60	0-35	0-20	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	GP-GM, SM, SP, SP-SM	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP
84D:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Ishpeming-------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0-5	90-100	85-100	45-70	0-15	---	NP
	6-24	Loamy sand, loamy fine sand, sand	SP, SM, SP-SM	A-4, A-2-4, A-3	0	0-5	90-100	85-100	45-95	0-50	---	NP
	24-38	Loamy fine sand, gravelly loamy sand	SM	A-4, A-2-4	0	0-15	85-100	80-100	35-90	5-50	---	NP
	38-48	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
84F:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
84F:												
Ishpeming-------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0-5	90-100	85-100	45-70	0-15	---	NP
	6-24	Loamy sand, loamy fine sand, sand	SP, SM, SP-SM	A-4, A-2-4, A-3	0	0-5	90-100	85-100	45-95	0-50	---	NP
	24-38	Loamy fine sand, gravelly loamy sand	SM	A-4, A-2-4	0	0-15	85-100	80-100	35-90	5-50	---	NP
	38-48	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
85A:												
Solona----------	0-9	Fine sandy loam	SM	A-4	0	0-5	90-100	85-95	55-85	30-50	0-20	NP-4
	9-25	Fine sandy loam, sandy loam, loam	ML, SM	A-2-4, A-4	0	0-5	90-100	85-95	50-95	25-75	0-25	---
	25-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0	0-10	70-80	65-75	45-75	25-50	0-20	NP-4
86B:												
Mashek----------	0-3	Fine sandy loam	SM	A-4	0-2	0-5	95-100	90-100	55-85	30-50	0-20	NP-4
	3-17	Fine sandy loam	SM	A-4	0-2	0-5	95-100	90-100	55-85	30-50	0-20	NP-4
	17-27	Loamy fine sand, fine sandy loam	SM	A-4	0-2	0-5	95-100	90-100	55-95	30-50	0-25	NP-7
	27-38	Cobbly fine sandy loam, loam	CL-ML, SM, SC-SM	A-4	0-2	0-30	75-95	70-90	50-90	30-70	25-30	NP-13
	38-43	Gravelly fine sandy loam, cobbly fine sandy loam	SC-SM, SM	A-4	0-2	0-30	75-95	70-90	45-75	25-50	0-20	NP-7
	43-80	Gravelly fine sandy loam, cobbly fine sandy loam	SC-SM, SM	A-4	0-5	5-30	70-80	65-75	45-75	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
87B:												
Cunard----------	0-4	Fine sandy loam	SM	A-4	0-3	0-10	95-100	90-100	65-85	35-50	0-20	NP-4
	4-19	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-3	0-10	95-100	90-100	55-85	25-50	0-30	NP-10
	19-27	Gravelly fine sandy loam, cobbly fine sandy loam	SM	A-4	0-3	5-15	70-90	65-85	45-75	25-50	0-20	NP-4
	27-37	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
88:												
Cathro----------	0-18	Muck	PT	A-8	---	---	---	---	---	---	---	---
	18-31	Muck	PT	A-8	---	---	---	---	---	---	---	---
	31-80	Fine sandy loam, gravelly fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0	0-10	75-100	70-100	45-80	20-50	0-20	NP-4
Ensley----------	0-5	Muck	PT	A-8	---	---	---	---	---	---	---	---
	5-19	Sandy loam, fine sandy loam, loam	SM, ML	A-2-4, A-4	0-3	0-8	90-100	85-100	50-95	25-75	0-25	NP-7
	19-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-3	0-15	65-90	60-85	45-75	25-50	0-20	NP-4
89B:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4
Solona----------	0-9	Fine sandy loam	SM	A-4	0	0-5	90-100	85-95	55-85	30-50	0-20	NP-4
	9-25	Fine sandy loam, sandy loam, loam	SM, ML	A-2-4, A-4	0	0-5	90-100	85-95	50-95	25-75	0-25	NP-7
	25-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0	3-10	70-80	65-75	45-75	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
90B:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4
Escanaba--------	0-6	Loamy fine sand	SM	A-4	0	0-3	95-100	90-100	75-95	30-50	---	NP
	6-26	Loamy fine sand, fine sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0	0-3	95-100	90-100	40-95	5-50	---	NP
	26-35	Loamy sand, fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0	0-8	95-100	90-100	40-95	10-50	0-20	NP-4
	35-42	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	95-100	90-100	50-95	25-50	0-25	NP-7
	42-80	Gravelly fine sandy loam, sandy loam	SM, SC-SM	A-4, A-2-4	0	0-15	70-100	65-95	50-75	25-50	0-20	NP-4
90D:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-4
	28-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
90D:												
Escanaba--------	0-6	Loamy fine sand	SM	A-4	0	0-3	95-100	90-100	75-95	30-50	---	NP
	6-26	Loamy fine sand, fine sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0	0-3	95-100	90-100	40-95	5-50	---	NP
	26-35	Loamy sand, fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0	0-8	95-100	90-100	40-95	10-50	0-20	NP-4
	35-42	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	95-100	90-100	50-95	25-50	0-25	NP-7
	42-80	Gravelly fine sandy loam, sandy loam	SM, SC-SM	A-2-4, A-4	0	0-15	70-100	65-95	50-75	25-50	0-20	NP-4
91B:												
Onaway----------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	6-13	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	13-18	Loam, sandy clay loam	CL-ML	A-4, A-6	0-3	0-8	90-100	85-100	65-95	30-75	10-30	4-18
	18-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-3	3-15	70-95	65-90	45-75	25-50	0-20	NP-4
Nadeau----------	0-7	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	50-85	30-50	0-25	NP-7
	7-17	Gravelly fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-10	70-95	65-90	45-70	20-45	0-25	NP-7
	17-23	Very gravelly sandy loam, very gravelly fine sandy loam	SM, GM	A-1, A-2-4, A-4	0	10-30	40-55	35-50	25-45	5-36	20-30	NP-4
	23-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	10-30	40-55	35-50	5-40	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
92A:												
Ensley----------	0-5	Muck	PT	A-8	---	---	---	---	---	---	---	---
	5-19	Loam, sandy loam, fine sandy loam	SM, ML	A-2-4, A-4	0-3	0-8	90-100	85-100	50-95	25-75	0-25	NP-7
	19-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-3	0-15	65-90	60-85	45-75	25-50	0-20	NP-4
Solona----------	0-9	Fine sandy loam	SM	A-4	0	0-5	90-100	85-95	55-85	30-50	0-20	NP-4
	9-25	Fine sandy loam, sandy loam, loam	ML, SM	A-2, A-4	0	0-5	90-100	85-95	50-95	25-75	0-25	NP-7
	25-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0	3-10	70-80	65-75	45-75	25-50	0-20	NP-4
93:												
Tawas-----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-25	Muck	PT	A-8	0	0	---	---	---	---	---	---
	25-80	Sand, fine sand, loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0	90-100	85-100	40-95	0-30	---	NP
Deford----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-80	Sand, loamy sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-75	0-30	---	NP
94B:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	40-85	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SC-SM, SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
94D:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	40-85	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SC-SM, SP-SM, SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
94E:												
Keweenaw--------	0-3	Loamy sand	SM	A-2-4	0-3	0-3	95-100	90-100	40-75	10-30	---	NP
	3-25	Loamy fine sand, loamy sand, sand	SM, SP-SM	A-4, A-2-4, A-3	0-3	0-5	90-100	85-100	40-85	5-50	---	NP
	25-80	Fine sandy loam, sand, loamy sand	SM, SC-SM, SP-SM	A-2-4, A-3, A-4	0-3	0-5	90-100	85-100	35-85	5-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
95B:												
Liminga---------	0-4	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP
	4-30	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP
	30-80	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP
95D:												
Liminga---------	0-4	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP
	4-30	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP
	30-80	Fine sand	SM	A-2-4	0	0	100	95-100	75-95	20-35	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
100E:												
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP-SM, SP, SM	A-3, A-2-4	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP-SM, SM, SP	A-3, A-2-4	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
100F:												
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP-SM, SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP-SM, SM, SP	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
103D:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Ocqueoc---------	0-2	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	2-7	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	7-27	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	5-35	---	NP
	27-80	Stratified silt loam to fine sand	CL-ML, ML, SM	A-2-4, A-4	0	0	100	100	75-100	30-90	0-25	NP-7
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
104C:												
Fence-----------	0-3	Very fine sandy loam	ML	A-4	0	0	100	95-100	85-100	70-90	0-20	NP-4
	3-7	Silt loam, very fine sandy loam	ML	A-4	0	0	100	95-100	80-100	70-90	0-20	NP-4
	7-19	Silt loam, very fine sandy loam, loamy very fine sand	ML	A-4	0	0	100	95-100	80-100	60-90	0-20	NP-4
	19-42	Silt loam, very fine sandy loam	CL-ML, ML	A-4	0	0	100	95-100	85-100	70-90	20-30	NP-11
	42-80	Stratified very fine sand to silt loam	SM, ML	A-4	0	0	100	95-100	50-95	30-90	0-25	NP-7
105C:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
106B:												
Sagola----------	0-5	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	5-20	Fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	55-95	30-50	0-20	NP-4
	20-56	Loamy sand, sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-85	10-50	0-30	NP-9
	56-80	Sandy loam, loamy sand	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-75	10-40	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
106B:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
106D:												
Sagola----------	0-5	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	5-20	Fine sandy loam, loamy fine sand	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	55-95	30-50	0-20	NP-4
	20-56	Loamy sand, sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-85	10-50	0-30	NP-9
	56-80	Sandy loam, loamy sand	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-75	10-40	0-20	NP-4
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
107B:												
Goodman---------	0-4	Silt loam	ML	A-4	0-5	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	4-30	Silt loam, very fine sandy loam	ML	A-4	0-5	0-5	95-100	90-100	75-100	45-65	0-20	NP-4
	30-71	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
	71-80	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-2	0-5	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
107D:												
Goodman---------	0-4	Silt loam	ML	A-4	0-5	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	4-30	Silt loam, very fine sandy loam	ML	A-4	0-5	0-5	95-100	90-100	75-100	45-65	0-20	NP-4
	30-71	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
	71-80	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
107F:												
Goodman---------	0-4	Silt loam	ML	A-4	0-5	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	4-30	Silt loam, very fine sandy loam	ML	A-4	0-5	0-5	95-100	90-100	75-100	45-65	0-20	NP-4
	30-71	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
	71-80	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-2	0-5	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
108B:												
Goodman----------	0-4	Silt loam	ML	A-4	0-5	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	4-30	Silt loam, very fine sandy loam	ML	A-4	0-5	0-5	95-100	90-100	75-100	45-65	0-20	NP-4
	30-71	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
	71-80	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
Wabeno----------	0-3	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	3-23	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	23-29	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	29-57	Sandy loam, gravelly sandy loam, loamy sand	SM	A-2-4	0-3	0-10	80-95	75-90	35-70	10-35	0-25	NP-7
	57-80	Gravelly sandy loam, sandy loam	SM	A-2-4	0-3	0-10	80-95	75-90	45-60	20-40	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
108D:												
Goodman---------	0-4	Silt loam	ML	A-4	0-5	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	4-30	Silt loam, very fine sandy loam	ML	A-4	0-5	0-5	95-100	90-100	75-100	45-65	0-20	NP-4
	30-71	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
	71-80	Loamy sand, sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-5	0-8	70-100	65-95	35-75	10-50	0-20	NP-4
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
Wabeno----------	0-3	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	3-23	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	23-29	Silt loam	ML	A-4	0-3	0-8	95-100	90-100	80-100	65-90	0-20	NP-4
	29-57	Sandy loam, loamy sand, gravelly fine sandy loam	SM	A-2-4	0-3	0-10	80-95	75-90	35-70	10-35	0-25	NP-7
	57-80	Sandy loam, gravelly sandy loam	SM	A-2-4	0-3	0-10	80-95	75-90	40-60	20-40	0-20	NP-4
109B:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
109B:												
Keweenaw--------	0-4	Cobbly loamy sand	SM	A-2-4	0-3	10-25	75-95	70-90	35-70	10-25	---	NP
	4-12	Cobbly loamy sand, cobbly loamy fine sand	SM	A-2-4, A-4	0-3	10-25	75-95	70-90	35-85	10-50	---	NP
	12-23	Cobbly sand, cobbly loamy sand	SM, SP, SP-SM	A-2-4, A-3	0-3	10-25	75-95	70-90	35-70	0-25	---	NP
	23-80	Fine sandy loam, sand, loamy sand	SM, SP, SP-SM	A-4, A-3, A-2-4	0-3	0-8	90-100	85-100	40-85	0-50	0-20	NP-4
109D:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Keweenaw--------	0-4	Cobbly loamy sand	SM	A-2-4	0-3	10-25	75-95	70-90	35-70	10-25	---	NP
	4-12	Cobbly loamy sand, cobbly loamy fine sand	SM	A-2-4, A-4	0-3	10-25	75-95	70-90	35-85	10-50	---	NP
	12-23	Cobbly sand, cobbly loamy sand	SP, SP-SM, SM	A-2-4, A-3	0-3	10-25	75-95	70-90	35-70	0-25	---	NP
	23-80	Fine sandy loam, sand, loamy sand	SM, SP, SP-SM	A-4, A-3, A-2-4	0-3	0-8	90-100	85-100	40-85	0-50	0-20	NP-4
109F:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
109F:												
Keweenaw--------	0-4	Cobbly loamy sand	SM	A-2-4	0-3	10-25	75-95	70-90	35-70	10-25	---	NP
	4-12	Cobbly loamy sand, cobbly loamy fine sand	SM	A-2-4, A-4	0-3	10-25	75-95	70-90	35-85	10-50	---	NP
	12-23	Cobbly sand, cobbly loamy sand	SP, SP-SM, SM	A-2-4, A-3	0-3	10-25	75-95	70-90	35-70	0-25	---	NP
	23-80	Fine sandy loam, sand, loamy sand	SM, SP, SP-SM	A-4, A-3, A-2-4	0-3	0-8	90-100	85-100	40-85	0-50	0-20	NP-4
110B:												
Nadeau----------	0-7	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	50-85	30-50	0-25	NP-7
	7-17	Gravelly fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-10	70-95	65-90	45-70	20-45	0-25	NP-7
	17-23	Very gravelly sandy loam, very gravelly fine sandy loam	SM, GM	A-1, A-2-4, A-4	0	10-30	40-55	35-50	25-45	5-36	20-30	NP-4
	23-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	10-30	40-55	35-50	5-40	0-10	---	NP
Mancelona-------	0-3	Sandy loam	SM	A-2-4	0	0-8	95-100	90-100	50-70	25-40	0-20	NP-4
	3-33	Loamy sand, sand, gravelly loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0-8	70-100	65-100	35-70	0-30	---	NP
	33-37	Gravelly loamy sand, sandy loam, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	70-95	65-90	35-70	10-40	0-20	NP-4
	37-80	Stratified sand, very gravelly sand	GP-GM, GP, SP, SP-SM	A-2-4, A-1, A-3	0	0-15	40-80	35-75	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
110D:												
Nadeau----------	0-7	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	50-85	30-50	0-20	NP-7
	7-17	Gravelly fine sandy loam, sandy loam	SM	A-2-4, A-4	0	0-10	70-95	65-90	45-70	20-45	0-25	NP-7
	17-23	Very gravelly sandy loam, very gravelly fine sandy loam	SM, GM	A-1, A-2-4, A-4	0	10-30	40-55	35-50	25-45	5-36	20-30	NP-4
	23-80	Very gravelly coarse sand, very gravelly sand	SW, GW	A-1	0	10-30	40-55	35-50	5-40	0-10	---	NP
Mancelona-------	0-3	Sandy loam	SM	A-2-4	0	0-8	95-100	90-100	50-70	25-40	0-20	NP-4
	3-33	Loamy sand, sand, gravelly loamy sand	SM, SP-SM	A-2-4, A-3	0	0-8	70-100	65-100	35-70	0-30	---	NP
	33-37	Gravelly loamy sand, sandy loam, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0	0-8	70-95	65-90	35-70	10-40	0-20	NP-4
	37-80	Stratified sand, very gravelly sand	SP, GP, GP-GM, SP-SM	A-1, A-3, A-2-4	0	0-15	40-80	35-75	20-60	0-15	---	NP
111B:												
Grayling--------	0-3	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	3-23	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	23-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
112D:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP-SM, SM, SP	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	SP-SM, SM, GP-GM, GP	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
112F:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Fine sandy loam, cobbly fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SM, SP-SM, SP	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP, SM, GP-GM, SP-SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly silt loam, cobbly fine sandy loam, gravelly fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
113B:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4
113D:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
113F:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4
114B:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
114D:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4
114F:												
Vanriper--------	0-3	Very cobbly silt loam	ML	A-4	3-25	25-40	60-85	55-80	55-80	45-70	0-20	NP-4
	3-20	Very cobbly very fine sandy loam, very cobbly silt loam, very stony fine sandy loam	ML, SM	A-4	3-40	10-40	55-90	50-85	45-80	25-70	0-20	NP-4
	20-80	Very cobbly fine sandy loam, very stony fine sandy loam, very cobbly sandy loam	SM	A-2-4, A-4	3-40	10-40	55-75	50-70	40-65	20-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
117B:												
Fence-----------	0-3	Very fine sandy loam	ML	A-4	0	0	100	95-100	85-100	70-90	0-20	NP-4
	3-7	Silt loam, very fine sandy loam	ML	A-4	0	0	100	95-100	80-100	70-90	0-20	NP-4
	7-19	Silt loam, very fine sandy loam, loamy very fine sand	ML	A-4	0	0	100	95-100	80-100	60-90	0-20	NP-4
	19-42	Silt loam, very fine sandy loam	CL-ML, ML	A-4	0	0	100	95-100	85-100	70-90	20-30	NP-11
	42-80	Stratified very fine sand to silt	SM, ML	A-4	0	0	100	95-100	50-95	30-90	0-25	NP-7
118A:												
Croswell--------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-34	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	34-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Deford----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-80	Sand, loamy sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-75	0-30	---	NP
119B:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-25	NP-7
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
119D:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	25-55	0-25	NP-7
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
121B:												
Onota-----------	0-2	Gravelly sandy loam	SM	A-2-4	0	0-15	70-90	65-85	40-60	20-35	0-20	NP-4
	2-7	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-20	NP-4
	7-22	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-20	NP-4
	22-32	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
122:												
Pleine----------	0-9	Very cobbly muck	PT	A-8	3-25	10-50	---	---	---	---	---	---
	9-20	Cobbly loam, sandy loam, very fine sandy loam	ML, SM	A-4, A-2-4	3-8	5-25	80-100	75-100	50-95	25-75	0-20	NP-4
	20-33	Sandy loam, cobbly loam, fine sandy loam	ML, SM	A-2-4, A-4	3-8	5-25	80-100	75-100	50-95	25-75	0-25	NP-7
	33-80	Gravelly sandy loam, fine sandy loam	SM	A-4, A-2-4	3-8	5-15	75-90	70-85	40-75	20-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
123A:												
Tula------------	0-8	Cobbly very fine sandy loam	ML, SM	A-4	0-8	8-30	80-100	75-95	70-95	40-65	0-20	NP-4
	8-20	Cobbly very fine sandy loam, cobbly fine sandy loam	ML, SM	A-4	0-8	8-30	80-100	75-95	55-85	30-65	0-20	NP-4
	20-28	Gravelly sandy loam, gravelly fine sandy loam	SM	A-2-4	0-8	5-10	75-85	70-80	45-75	20-50	0-20	NP-4
	28-62	Gravelly sandy loam, gravelly loam, gravelly loamy sand	CL-ML, SM	A-2-4, A-4	0-8	5-10	65-90	60-85	30-80	10-65	0-25	NP-7
	62-80	Gravelly sandy loam	SM	A-4, A-2-4	0-8	5-10	65-90	60-85	35-60	15-36	0-20	NP-4
124B:												
Gogebic---------	0-5	Cobbly silt loam	ML	A-4	5-10	10-20	75-95	70-90	65-90	55-85	0-20	NP-4
	5-18	Cobbly sandy loam, very fine sandy loam, cobbly fine sandy loam	ML, SM	A-2-4, A-4	0-10	1-20	75-100	75-95	50-90	25-60	0-20	NP-4
	18-62	Very gravelly loamy sand, cobbly sandy loam, very gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	30-60	10-40	0-25	NP-7
	62-80	Very gravelly sandy loam, gravelly sandy loam	SM	A-2-4	0-15	8-30	50-70	45-65	35-60	10-30	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
124B:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
124D:												
Gogebic---------	0-5	Cobbly silt loam	ML	A-4	5-10	10-20	75-95	70-90	65-90	55-85	0-20	NP-4
	5-18	Cobbly sandy loam, very fine sandy loam, cobbly fine sandy loam	ML, SM	A-2-4, A-4	0-10	1-20	75-100	75-95	50-90	25-60	0-20	NP-4
	18-62	Very gravelly loamy sand, cobbly sandy loam, very gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	30-60	10-40	0-25	NP-7
	62-80	Very gravelly sandy loam, gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	35-60	10-30	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
124D:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
125D:												
Keweenaw--------	0-4	Cobbly loamy sand	SM	A-2-4	0-3	10-25	75-95	70-90	35-70	10-25	---	NP
	4-12	Cobbly loamy fine sand, cobbly loamy sand	SM	A-2-4, A-4	0-3	10-25	75-95	70-90	35-85	10-50	---	NP
	12-23	Cobbly sand, cobbly loamy sand	SP, SM, SP-SM	A-2-4, A-3	0-3	10-25	75-95	70-90	35-70	0-25	---	NP
	23-80	Fine sandy loam, sand, loamy sand	SM, SP, SP-SM	A-4, A-3, A-2-4	0-3	0-8	90-100	85-100	40-85	0-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
125F:												
Keweenaw--------	0-4	Cobbly loamy sand	SM	A-2-4	0-3	10-25	75-95	70-90	35-70	10-25	---	NP
	4-12	Cobbly loamy fine sand, cobbly loamy sand	SM	A-2-4, A-4	0-3	10-25	75-95	70-90	35-85	10-50	---	NP
	12-23	Cobbly sand, cobbly loamy sand	SP, SM, SP-SM	A-2-4, A-3	0-3	10-25	75-95	70-90	35-70	0-25	---	NP
	23-80	Fine sandy loam, sand, loamy sand	SM, SP, SP-SM	A-4, A-3, A-2-4	0-3	0-8	90-100	85-100	40-85	0-50	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
126B:												
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	90-100	85-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
126D:												
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	90-100	85-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
126E:												
Sundog----------	0-2	Silt loam	ML	A-4	0-2	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-2	0-5	90-100	85-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
127B:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
127D:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
127F:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
128B:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GW, SM, SW	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
128D:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GW, SM, SW	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
128E:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
128E:												
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GM, SM, GW	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
129C:												
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
130A:												
Chabeneau-------	0-5	Silt loam	ML	A-4	0	0-8	90-100	85-100	70-100	50-90	0-20	NP-4
	5-22	Silt loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-8	90-100	85-100	50-100	30-90	0-20	NP-4
	22-80	Stratified sand to very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-3, A-1	0-2	0-15	40-85	35-80	10-65	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
131:												
Witbeck---------	0-8	Very stony muck	PT	A-8	15-25	8-25	---	---	---	---	---	---
	8-15	Very stony very fine sandy loam, very stony sandy loam	SM, ML	A-4, A-2-4	15-25	8-25	80-100	75-95	50-95	25-65	0-20	NP-4
	15-22	Very stony fine sandy loam, stony very fine sandy loam	ML, SM	A-2-4, A-4	15-25	8-20	80-100	75-95	55-95	30-65	0-20	NP-4
	22-80	Gravelly sandy loam, gravelly loamy sand	SM	A-2-4	0-8	0-15	75-85	70-80	30-60	10-35	0-20	NP-4
Cathro----------	0-18	Muck	PT	A-8	---	---	---	---	---	---	---	---
	18-31	Muck	PT	A-8	---	---	---	---	---	---	---	---
	31-80	Fine sandy loam, gravelly fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0	0-10	75-100	70-100	45-80	20-50	0-20	NP-4
132.												
Slickens												
133B:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP-SM, SP, SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP, SM, GP-GM, SP-SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
133B:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
133D:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP-SM, SP, SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP, SM, GP-GM, SP-SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
133D:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
134B:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SM, SP, SP-SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP-GM, GP, SP-SM, SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
134D:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SM, SP, SP-SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP-GM, GP, SP-SM, SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP
134F:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SM, SP, SP-SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP-GM, GP, SP-SM, SM	A-1, A-2-4, A-3	0-15	5-45	40-80	35-75	30-65	0-25	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
135A:												
Witbeck---------	0-8	Very stony muck	PT	A-8	15-25	8-25	---	---	---	---	---	---
	8-15	Very stony very fine sandy loam, very stony sandy loam	SM, ML	A-2-4, A-4	15-25	8-25	80-100	75-95	50-95	25-65	0-20	NP-4
	15-22	Very stony fine sandy loam, stony very fine sandy loam	ML, SM	A-2-4, A-4	15-25	8-20	80-100	75-95	55-95	30-65	0-20	NP-4
	22-80	Gravelly sandy loam, gravelly loamy sand	SM	A-2-4	0-8	0-15	75-85	70-80	30-60	10-35	0-20	NP-4
Net-------------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	0-15	15-30	90-100	85-95	70-90	40-60	0-20	NP-4
	5-18	Cobbly very fine sandy loam, silt loam, gravelly very fine sandy loam	ML, SM	A-4	0-15	0-30	90-100	85-100	70-95	40-85	0-20	NP-4
	18-45	Gravelly sandy loam, gravelly loamy sand, gravelly fine sandy loam	SC-SM, SM	A-2-4, A-4	0-10	0-15	75-90	70-85	30-75	10-50	0-20	NP-4
	45-80	Gravelly sandy loam, gravelly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	0-10	0-15	75-90	70-85	30-75	10-50	0-20	NP-4
136A:												
Minocqua--------	0-5	Muck	PT	A-8	0	0	---	---	---	---	---	---
	5-23	Fine sandy loam, sandy loam, silt loam	SM, ML	A-2-4, A-4	0	0	90-100	85-100	50-100	25-90	0-25	NP-7
	23-80	Very gravelly sand, gravelly coarse sand, sand	GP, SP-SM, GP-GM, SP	A-1, A-3	0	0	40-95	35-90	5-65	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
136A:												
Channing--------	0-9	Fine sandy loam	SM	A-4	0	0-5	90-100	85-100	55-85	30-50	0-20	NP-4
	9-22	Very fine sandy loam, fine sandy loam	ML, SM	A-4	0	0-5	90-100	85-100	55-95	30-65	0-20	NP-4
	22-80	Stratified very gravelly sand, sand	SP, SP-SM, GP, GP-GM	A-1, A-3	0	0-15	40-80	35-75	10-60	0-15	---	NP
137D:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP, SP-SM, SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	SM, GP, SP-SM, GP-GM	A-3, A-2-4, A-1	0-15	5-45	40-80	35-75	30-65	0-25	---	NP
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-3, A-1	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
137F:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Cobbly fine sandy loam, fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP, SP-SM, SM	A-3, A-2-4	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	SM, GP, SP-SM, GP-GM	A-3, A-2-4, A-1	0-15	5-45	40-80	35-75	30-65	0-25	---	NP
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
138D:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
138F:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
139B:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP
139D:												
Sundog----------	0-2	Silt loam	ML	A-4	0-8	0-10	85-100	80-100	80-100	65-90	0-20	NP-4
	2-22	Silt loam, very fine sandy loam, fine sandy loam	SM, ML	A-4	0-8	0-10	85-100	80-100	55-100	30-90	0-20	NP-4
	22-80	Stratified sand, very gravelly coarse sand	SP, GP, SP-SM, GP-GM	A-1, A-3	0-8	0-20	40-90	35-85	20-60	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
140B:												
Champion--------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-20	85-100	80-95	55-85	30-50	0-20	NP-4
	5-26	Cobbly fine sandy loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-20	85-100	80-95	55-95	30-65	0-20	NP-4
	26-43	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
	43-80	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
140D:												
Champion--------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-20	85-100	80-95	55-85	30-50	0-20	NP-4
	5-26	Cobbly fine sandy loam, very fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-20	85-100	80-95	55-95	30-65	0-20	NP-4
	26-43	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM, SC-SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
	43-80	Gravelly fine sandy loam, gravelly loamy sand, gravelly sandy loam	SM	A-2-4, A-4	0-8	0-15	70-85	65-80	35-75	10-50	0-20	NP-4
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
141D:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	0-20	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SP, SM, SP-SM	A-2-4, A-3	0-3	0-15	65-80	60-75	30-60	0-35	0-20	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	GP-GM, SM, SP, SP-SM	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
142B:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	0-20	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SP, SM, SP-SM	A-3, A-2-4	0-3	0-20	65-80	60-75	30-60	0-35	0-20	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	GP-GM, SM, SP, SP-SM	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
142D:												
Pelissier-------	0-6	Gravelly sandy loam	SM	A-2-4	0-3	0-10	65-80	60-75	35-55	15-35	0-20	NP-4
	6-10	Gravelly sandy loam, cobbly loamy sand, gravelly sand	SP-SM, SP, SM	A-2-4, A-3	0-3	0-20	65-80	60-75	30-60	0-35	0-20	NP-4
	10-21	Very gravelly loamy coarse sand, gravelly coarse sand	GP-GM, SP, SP-SM, SM	A-1-b, A-2-4	0-3	0-20	40-75	35-70	5-50	0-20	---	NP
	21-80	Very gravelly coarse sand, very gravelly sand, extremely gravelly coarse sand	GW	A-1	0-3	0-20	35-50	30-45	5-40	0-10	---	NP
144B:												
Farquar---------	0-6	Gravelly sandy loam	SM	A-2-4	0	0-8	60-80	55-75	40-55	20-35	0-20	NP-4
	6-9	Very gravelly loamy sand, very gravelly loamy coarse sand	GW, GM, SM	A-1-b, A-2-4	0	0-15	40-60	35-55	5-45	0-30	---	NP
	9-20	Very gravelly coarse sand, very gravelly loamy coarse sand, very gravelly loamy sand	GW, SM	A-1-b	0	0-15	40-60	35-55	5-45	0-30	---	NP
	20-36	Very gravelly coarse sand, very gravelly sand	GW	A-1	0-3	0-20	40-65	35-60	5-45	0-15	---	NP
	36-80	Stratified very gravelly coarse sand to sand	SP, GP, SP-SM, GP-GM	A-3, A-1	0-3	0-20	40-90	35-85	5-55	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
145C:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-100	45-95	20-55	0-25	NP-7
146B:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
146B:												
Skanee----------	0-7	Cobbly fine sandy loam	SM	A-4	0-3	10-20	85-100	80-95	50-80	30-50	0-20	NP-4
	7-12	Fine sandy loam, cobbly sandy loam, sandy loam	SM	A-2-4, A-4	0-3	3-20	85-100	80-100	50-80	25-50	0-20	NP-4
	12-30	Sandy loam, loamy sand, sandy clay loam	SC-SM, SM, SC	A-2-4, A-4, A-6	0-3	0-8	90-100	85-100	40-95	10-55	20-35	NP-15
	30-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
147A:												
Skanee----------	0-7	Cobbly fine sandy loam	SM	A-4	0-3	10-20	85-100	80-95	50-80	30-50	0-20	NP-4
	7-12	Fine sandy loam, cobbly sandy loam, sandy loam	SM	A-2-4, A-4	0-3	3-20	85-100	80-100	50-80	25-50	0-20	NP-4
	12-30	Sandy loam, loamy sand, sandy clay loam	SC-SM, SM, SC	A-2-4, A-4, A-6	0-3	0-8	90-100	85-100	40-95	10-55	20-35	NP-15
	30-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
Gay-------------	0-2	Muck	PT	A-8	---	---	---	---	---	---	---	---
	2-18	Fine sandy loam, gravelly loamy sand, cobbly sandy loam	SM	A-2-4, A-4	0-8	0-15	80-100	75-100	35-85	10-50	0-25	NP-7
	18-31	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-25	NP-7
	31-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	50-85	25-50	0-25	NP-7

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
148B:												
Shoepac----------	0-6	Silt loam	ML	A-4	0-3	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	6-23	Fine sandy loam, very fine sandy loam	ML, SM	A-4	0-3	0-5	95-100	90-100	50-95	25-65	0-20	NP-4
	23-53	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-5	85-100	80-100	40-80	10-50	20-30	NP-9
	53-80	Sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-3	0-15	70-90	65-85	45-75	15-50	0-20	NP-4
Ensley-----------	0-5	Muck	PT	A-8	---	---	---	---	---	---	---	---
	5-19	Loam, sandy loam, loam, fine sandy loam	SM, ML	A-2-4, A-4	0-3	0-8	90-100	85-100	50-95	25-75	0-25	NP-7
	19-80	Gravelly fine sandy loam	SC-SM, SM	A-4	0-3	0-15	65-90	60-85	45-75	25-50	0-20	NP-4
149:												
Evart------------	0-10	Silt loam	ML	A-4	0	0	100	95-100	90-100	70-90	0-20	NP-4
	10-80	Fine sand, sand, loamy sand	SP-SM, SP, SM	A-2-4, A-3	0	0	90-100	85-100	40-95	0-35	---	NP
Cathro-----------	0-18	Muck	PT	A-8	---	---	---	---	---	---	---	---
	18-31	Muck	PT	A-8	---	---	---	---	---	---	---	---
	31-80	Gravelly fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0	0-10	75-100	70-100	45-80	20-50	0-20	NP-4
150:												
Shag-------------	0-2	Muck	PT	A-8	---	---	---	---	---	---	---	---
	2-11	Silt loam	ML	A-4	0	0-3	100	95-100	80-100	75-90	0-20	NP-4
	11-25	Silt loam, very fine sandy loam	ML	A-4	0	0-3	100	95-100	75-100	70-90	20-25	NP-7
	25-80	Stratified loamy very fine sand to silt loam	CL, CL-ML, ML	A-4	0	0-3	100	95-100	80-100	60-95	20-25	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
151A:												
Spear-----------	0-2	Very fine sandy loam	ML, CL-ML	A-4	0	0-3	100	95-100	75-95	70-80	0-20	NP-4
	2-6	Very fine sandy loam	CL-ML, ML	A-4	0	0-3	100	95-100	75-100	70-80	0-20	NP-4
	6-31	Very fine sandy loam, silt loam	CL-ML, ML	A-4	0	0	100	95-100	75-100	70-85	20-25	NP-7
	31-80	Stratified loamy very fine sand to silt loam	CL-ML, ML	A-4	0	0	100	95-100	80-100	60-95	20-25	NP-7
153D:												
Ishpeming-------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0-5	90-100	85-100	45-70	0-15	0-0	NP
	6-24	Loamy sand, loamy fine sand, sand	SP, SP-SM, SM	A-2-4, A-3, A-4	0	0-5	90-100	85-100	45-95	0-50	0-0	NP
	24-38	Loamy fine sand, gravelly loamy sand	SM	A-4, A-2-4	0	0-15	85-100	80-100	35-90	5-50	0-0	NP
	38-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
153F:												
Ishpeming-------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0-5	90-100	85-100	45-70	0-15	---	NP
	6-24	Loamy sand, loamy fine sand, sand	SP, SP-SM, SM	A-4, A-2-4, A-3	0	0-5	90-100	85-100	45-95	0-50	---	NP
	24-38	Loamy fine sand, gravelly loamy sand	SM	A-4, A-2-4	0	0-15	85-100	80-100	35-90	5-50	---	NP
	38-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
154B:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP-SM, SP	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP-SM, SP, SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
154D:												
Rubicon---------	0-7	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP-SM, SP	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Sayner----------	0-2	Loamy sand	SM	A-2-4	0	0-8	90-100	85-100	40-75	10-30	---	NP
	2-14	Loamy sand, sand	SP, SP-SM, SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	14-27	Loamy sand, sand	SP, SM, SP-SM	A-2-4, A-3	0	0-8	90-100	85-100	40-75	0-30	---	NP
	27-80	Stratified sand to gravelly coarse sand	SP-SM, SP	A-3, A-1-b	0	0-15	65-90	60-85	15-55	0-15	---	NP
155A:												
Zeba------------	0-14	Cobbly fine sandy loam	SM	A-2-4, A-4	0	15-30	75-95	70-90	55-80	30-50	0-20	NP-4
	14-31	Loamy sand, sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-15	85-100	80-100	40-80	15-50	0-25	NP-7
	31-41	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
155A:												
Jacobsville-----	0-4	Muck	PT	A-8	0-5	0	---	---	---	---	---	---
	4-9	Loam, gravelly sandy loam, fine sandy loam	ML, SM	A-2-4, A-4	0-5	0-15	80-100	75-95	45-95	20-75	0-20	NP-4
	9-16	Sandy loam, fine sandy loam, gravelly sandy loam	SM	A-2-4, A-4	0-3	0-15	80-100	75-95	45-85	20-50	0-25	NP-7
	16-28	Sandy loam, gravelly sandy loam	SM	A-2-4	0-3	0-5	90-100	85-95	45-70	20-40	0-25	NP-7
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
156B:												
Duel------------	0-2	Loamy sand	SM	A-2-4	0-8	0-8	95-100	90-100	40-75	10-30	---	NP
	2-22	Loamy sand, sand	SP, SP-SM, SM	A-2-4, A-3	0-8	0-8	95-100	90-100	40-75	0-30	---	NP
	22-32	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
	32-40	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
157B:												
Reade-----------	0-7	Silt loam	ML	A-4	0-3	0-10	95-100	90-100	75-95	50-65	0-20	NP-4
	7-15	Very fine sandy loam, fine sandy loam	SM, ML	A-4	0-3	0-10	95-100	90-100	50-90	30-60	0-20	NP-4
	15-28	Loamy fine sand, fine sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-3	0-10	80-100	75-100	50-90	30-50	0-20	NP-4
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Nahma-----------	0-11	Muck	PT	A-8	0	0	---	---	---	---	---	---
	11-14	Mucky loam	ML	A-4	0	0-5	90-100	85-100	70-95	50-75	20-30	NP-9
	14-24	Sandy loam, loam, gravelly fine sandy loam	ML, SM	A-2-4, A-4	2-5	0-10	80-100	75-100	50-95	25-75	20-30	NP-9
	24-34	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
158C:												
Munising--------	0-6	Fine sandy loam	SM	A-4	0-3	0-8	95-100	90-100	55-85	30-45	0-20	NP-4
	6-18	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-4
	18-50	Sandy loam, loamy sand, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	40-95	10-50	0-30	NP-9
	50-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-8	95-100	90-100	50-85	25-50	0-20	NP-6
Onota-----------	0-2	Gravelly sandy loam	SM	A-2-4	0	0-15	70-90	65-85	40-60	20-35	0-25	NP-7
	2-7	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-25	NP-11
	7-22	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-25	NP-10
	22-32	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	0-20	NP
	10-30	Loamy sand, fine sand, sand	SM, SP-SM	A-2-4	0	0-5	95-100	90-100	35-95	5-35	0-20	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-20	NP-7
159A:												
Jeske-----------	0-11	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	11-21	Sand, loamy sand	SP-SM, SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-75	0-30	---	NP
	21-31	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
	31-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
160B:												
Paquin----------	0-11	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	11-12	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	12-14	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	14-36	Sand, fine sand	SP-SM, SP, SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
	36-80	Sand, fine sand	SP, SM, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-95	0-35	---	NP
Finch-----------	0-10	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	10-20	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	20-29	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	29-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
161B:												
Yellowdog-------	0-32	Very channery sand	GW, SW	A-1	0-5	5-30	40-55	35-50	25-45	0-10	---	NP
	32-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
162B:												
Buckroe---------	0-4	Very channery loamy sand	GW, SM	A-2-4, A-1	0-15	5-30	45-60	40-55	30-55	0-25	---	NP
	4-15	Very channery sand, very channery loamy sand	GW, SM	A-3, A-1, A-2-4	0-15	5-30	45-60	40-55	30-55	0-25	---	NP
	15-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
165B:												
Chocolay--------	0-8	Very cobbly fine sandy loam	SM	A-4	10-20	20-35	45-70	40-65	40-65	25-45	0-20	NP-4
	8-14	Very cobbly fine sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4, A-4	10-20	20-35	40-70	35-65	35-60	20-45	0-20	NP-4
	14-27	Very cobbly fine sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4, A-4	10-20	20-35	40-70	35-65	35-60	20-45	0-20	NP-4
	27-37	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
165B:												
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GW, SM, SW	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	SW, GW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
166:												
Skandia---------	0-4	Mucky peat	PT	A-8	0	0	---	---	---	---	---	---
	4-26	Muck	PT	A-8	0	0	---	---	---	---	---	---
	26-31	Weathered bedrock	---	---	0	0	---	---	---	---	---	---
	31-41	Unweathered bedrock	---	---	0	0	---	---	---	---	---	---
167:												
Skandia---------	0-4	Mucky peat	PT	A-8	0	0	---	---	---	---	---	---
	4-26	Muck	PT	A-8	0	0	---	---	---	---	---	---
	26-31	Weathered bedrock	---	---	0	0	---	---	---	---	---	---
	31-41	Unweathered bedrock	---	---	0	0	---	---	---	---	---	---
Jacobsville-----	0-4	Muck	PT	A-8	0-5	---	---	---	---	---	---	---
	4-9	Loam, gravelly sandy loam, fine sandy loam	ML, SM	A-2-4, A-4	0-5	0-15	80-100	75-95	45-95	20-75	0-20	NP-4
	9-16	Sandy loam, fine sandy loam, gravelly sandy loam	SM	A-2-4, A-4	0-3	0-15	80-100	75-95	45-85	20-50	0-25	NP-7
	16-28	Sandy loam, gravelly sandy loam	SM	A-2-4	0-3	0-5	90-100	85-95	45-70	20-40	0-25	NP-7
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
168B:												
Yellowdog-------	0-32	Very channery sand	SW, GW	A-1	0-5	5-30	40-55	35-50	25-45	0-10	---	NP
	32-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Burt------------	0-7	Muck	PT	A-8	0	0	---	---	---	---	---	NP
	7-18	Sand, gravelly sand	SP, SP-SM	A-1-b, A-3	0	0-8	70-95	65-90	35-65	0-15	---	NP
	18-28	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
170B:												
Chocolay--------	0-8	Very cobbly fine sandy loam	SM	A-4	10-20	20-35	45-70	40-65	40-65	25-45	0-20	NP-4
	8-14	Very cobbly fine sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4, A-4	10-20	20-35	40-70	35-65	35-60	20-45	0-20	NP-4
	14-27	Very cobbly fine sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4, A-4	10-20	20-35	40-70	35-65	35-60	20-45	0-20	NP-4
	27-37	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
171B:												
Paavola---------	0-8	Very gravelly loamy sand	GM, SM	A-1, A-2-4	5-15	5-15	45-70	40-65	25-55	5-25	---	NP
	8-33	Extremely gravelly sand, extremely gravelly loamy sand, extremely cobbly sand	GW, GM	A-1, A-2-4	5-15	5-45	25-50	20-45	10-40	0-25	---	NP
	33-80	Very cobbly loamy fine sand, very cobbly fine sandy loam, gravelly sandy loam	GM, SM	A-1, A-2-4, A-4	5-15	5-45	45-85	40-80	30-60	5-45	0-25	NP-6

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
172D:												
Buckroe---------	0-4	Very channery loamy sand	SM, GM	A-2-4, A-1	0-15	5-30	45-60	40-55	30-55	5-25	---	NP
	4-15	Very channery sand, very channery loamy sand	GP-GM, SP, SP-SM, GP	A-2-4, A-1, A-3	0-15	5-30	45-55	40-55	30-55	0-25	---	NP
	15-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
172F:												
Buckroe---------	0-4	Very channery loamy sand	SM, GM	A-1, A-2-4	0-15	5-30	45-60	40-55	30-55	5-25	---	NP
	4-15	Very channery sand, very channery loamy sand	GP-GM, SP, SP-SM, GP	A-2-4, A-1, A-3	0-15	5-30	45-55	40-55	30-55	0-25	---	NP
	15-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
173B:												
Pence-----------	0-6	Fine sandy loam	SM	A-4	0	0-8	90-100	85-95	55-85	30-50	0-20	NP-4
	6-13	Gravelly sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-8	65-100	60-95	40-85	20-50	0-20	NP-4
	13-31	Gravelly coarse sand, loamy sand, coarse sand	SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0-8	65-95	60-90	20-70	0-30	---	NP
	31-80	Stratified very gravelly coarse sand to sand	GP, SP-SM, SP, GP-GM	A-1, A-3	0	0-8	45-95	40-90	10-65	0-15	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
173D:												
Pence-----------	0-6	Fine sandy loam	SM	A-4	0	0-8	90-100	85-95	55-85	30-50	0-20	NP-4
	6-13	Gravelly sandy loam, fine sandy loam	SM	A-2-4, A-4	0	0-8	65-100	60-95	40-85	20-50	0-20	NP-4
	13-31	Gravelly coarse sand, loamy sand, coarse sand	SP-SM, SM, SP	A-2-4, A-1-b, A-3	0	0-8	65-95	60-90	20-70	0-30	---	NP
	31-80	Stratified very gravelly coarse sand to sand	GP, SP-SM, SP, GP-GM	A-1, A-3	0	0-8	45-95	40-90	10-65	0-15	---	NP
174D:												
Yalmer----------	0-10	Fine sand	SM	A-2-4	0	0-5	95-100	90-100	70-95	15-35	---	NP
	10-30	Loamy sand, fine sand, sand	SP-SM, SM	A-3, A-2-4	0	0-5	95-100	90-100	35-95	5-35	---	NP
	30-80	Loamy fine sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-5	90-100	85-95	45-95	20-55	0-25	NP-7
Rubicon---------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-18	Sand	SP, SP-SM	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
	18-80	Sand	SP-SM, SP	A-3, A-2-4	0	0	95-100	90-100	45-70	0-15	---	NP
Urban land.												
175E:												
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GW, SM	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
175F:												
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Waiska----------	0-4	Cobbly loamy sand	SM	A-2-4	0	15-30	80-95	75-90	35-70	10-25	---	NP
	4-36	Very cobbly sand, very gravelly coarse sand	GW, SM, SW	A-1, A-2-4	0	0-30	40-60	35-55	10-50	0-25	---	NP
	36-80	Very gravelly coarse sand, very gravelly sand	GW, SW	A-1	0	0-30	40-55	35-50	5-45	0-10	---	NP
176B:												
Greenwood-------	0-8	Peat	PT	A-8	0	0	---	---	---	---	---	---
	8-80	Mucky peat	PT	A-8	0	0	---	---	---	---	---	---
Croswell--------	0-7	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	7-34	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	34-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
177E:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
177F:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
178D:												
Schweitzer------	0-5	Cobbly very fine sandy loam	SM, ML	A-4	2-15	10-30	80-95	75-90	70-85	40-65	0-20	NP-4
	5-21	Cobbly very fine sandy loam, cobbly silt loam, fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-90	55-90	30-80	0-20	NP-4
	21-43	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-20	NP-4
	43-61	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-25	NP-7
	61-80	Very cobbly loamy sand, very gravelly loamy sand, cobbly sandy loam	SM	A-1-b, A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	5-45	0-20	NP-4
Kalkaska--------	0-6	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
178F:												
Schweitzer------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-90	70-85	40-65	0-20	NP-4
	5-21	Cobbly very fine sandy loam, cobbly silt loam, fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-90	55-90	30-80	0-20	NP-4
	21-43	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-20	NP-4
	43-61	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-25	NP-7
	61-80	Very cobbly loamy sand, very gravelly loamy sand, cobbly sandy loam	SM	A-1-b, A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	5-45	0-20	NP-4
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
179E:												
Schweitzer------	0-5	Cobbly very fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-90	70-85	40-65	0-20	NP-4
	5-21	Cobbly very fine sandy loam, cobbly silt loam, fine sandy loam	ML, SM	A-4	2-15	10-30	80-95	75-90	55-90	30-80	0-20	NP-4
	21-43	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-20	NP-4
	43-61	Very cobbly sandy loam, very cobbly loamy sand, gravelly fine sandy loam	SM	A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	10-45	0-25	NP-7
	61-80	Very cobbly loamy sand, very gravelly loamy sand, cobbly sandy loam	SM	A-1-b, A-2-4, A-4	2-15	5-35	50-75	45-70	30-70	5-45	0-20	NP-4
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
180E:												
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
180F:												
Kalkaska--------	0-6	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	6-8	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	8-17	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
	17-80	Sand	SP-SM, SP	A-2-4, A-3	0	0	95-100	90-100	45-70	0-15	---	NP
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
181E:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
181E:												
Tokiahok--------	0-11	Loamy fine sand	SM	A-4	0	0-3	90-100	85-100	75-95	30-50	---	NP
	11-24	Loamy sand, loamy fine sand, sand	SP-SM, SM	A-4, A-3, A-2-4	0	0-3	90-100	85-100	40-95	5-50	---	NP
	24-49	Loamy sand, fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	40-85	10-50	0-25	NP-7
	49-59	Fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-25	NP-7
	59-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-20	NP-4
181F:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
Tokiahok--------	0-11	Loamy fine sand	SM	A-4	0	0-3	90-100	85-100	75-95	30-50	---	NP
	11-24	Loamy sand, loamy fine sand, sand	SP-SM, SM	A-2-4, A-3, A-4	0	0-3	90-100	85-100	40-95	5-50	---	NP
	24-49	Loamy sand, fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	40-85	10-50	0-25	NP-7
	49-59	Fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-25	NP-7
	59-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
184C:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	0-10	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	0-10	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	0-20	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Witbeck---------	0-8	Very stony muck	PT	A-8	15-25	8-25	---	---	---	---	---	---
	8-15	Very stony very fine sandy loam, very stony sandy loam	SM, ML	A-4	15-25	8-25	80-100	75-95	50-95	25-65	0-25	NP-7
	15-22	Very stony fine sandy loam, stony very fine sandy loam	ML, SM	A-2-4, A-4	15-25	8-20	80-100	75-95	55-95	30-65	0-20	NP-4
	22-80	Gravelly sandy loam, gravelly loamy sand	SM	A-2-4	0-8	0-15	75-85	70-80	30-60	10-35	0-20	NP-4
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
185B:												
Northland-------	0-5	Loamy fine sand	SM	A-4	0	0-5	85-100	80-95	70-95	30-50	0-20	NP-4
	5-8	Fine sandy loam	SM	A-4	0	0-5	85-100	80-95	55-85	30-50	0-20	NP-4
	8-18	Sandy loam, loam, gravelly fine sandy loam	SC-SM, SM, ML	A-4, A-2-4	0	0-5	70-95	65-90	45-90	25-75	20-30	NP-9
	18-80	Very gravelly coarse sand, very gravelly sand, very gravelly loamy coarse sand	GW, SW	A-1	0	0-30	35-55	30-50	5-40	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
187B:												
Reade-----------	0-7	Silt loam	ML	A-4	0-3	0-10	95-100	90-100	75-95	50-65	0-20	NP-4
	7-15	Very fine sandy loam, fine sandy loam	SM, ML	A-4	0-3	0-10	95-100	90-100	50-90	30-60	0-20	NP-4
	15-28	Loamy fine sand, fine sandy loam, gravelly fine sandy loam	SM	A-4, A-2-4	0-3	0-10	80-100	75-100	50-90	30-50	0-20	NP-4
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
190B:												
Emmet-----------	0-3	Fine sandy loam	SM	A-4	0-5	0-8	95-100	90-100	55-85	30-50	0-20	NP-4
	3-21	Sandy loam, fine sandy loam	SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	0-20	NP-4
	21-28	Sandy loam, fine sandy loam	SM, SC-SM	A-2-4, A-4	0-5	0-8	95-100	90-100	55-85	25-50	20-30	NP-10
	28-80	Gravelly fine sandy loam	SM, SC-SM	A-4	0-5	0-15	70-90	65-85	45-75	25-50	0-20	NP-4
Cunard----------	0-4	Fine sandy loam	SM	A-4	0-3	0-10	95-100	90-100	65-85	35-50	0-20	NP-4
	4-19	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-3	0-10	95-100	90-100	55-85	25-50	0-30	NP-10
	19-27	Gravelly fine sandy loam, cobbly fine sandy loam	SM	A-4	0-3	5-15	70-90	65-85	45-75	25-50	0-20	NP-4
	27-37	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
191B:												
Nahma-----------	0-11	Muck	PT	A-8	0	0	---	---	---	---	---	---
	11-14	Mucky loam	ML	A-4	0	0-5	90-100	85-100	70-95	50-75	20-30	NP-9
	14-24	Sandy loam, loam, gravelly fine sandy loam	ML, SM	A-2-4, A-4	2-5	0-10	80-100	75-100	50-95	25-75	20-30	NP-9
	24-34	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
191B:												
Sundell---------	0-8	Loam	ML	A-4	0-2	0-8	95-100	90-100	75-95	55-75	0-20	NP-4
	8-17	Sandy loam, loam, fine sandy loam	ML, SM	A-4	0-2	0-8	95-100	90-100	50-85	35-70	0-20	NP-4
	17-22	Gravelly fine sandy loam, fine sandy loam	SC-SM, SM	A-4	0-5	0-10	70-80	65-75	45-75	25-50	0-20	NP-4
	22-40	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
193E:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SM, SC-SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
Tokiahok--------	0-11	Loamy fine sand	SM	A-4	0	0-3	90-100	85-100	75-95	30-50	---	NP
	11-24	Loamy sand, loamy fine sand, sand	SP-SM, SM	A-3, A-2-4, A-4	0	0-3	90-100	85-100	40-95	5-50	---	NP
	24-49	Loamy sand, fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	40-85	10-50	0-25	NP-7
	49-59	Fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-25	NP-7
	59-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
194E:												
Sporley---------	0-6	Silt loam	ML	A-4	0	0	100	95-100	90-100	70-90	0-20	NP-4
	6-16	Silt loam, very fine sandy loam	ML	A-4	0	0	100	95-100	85-100	70-90	0-20	NP-4
	16-45	Very fine sandy loam, silt loam	CL-ML, ML	A-4	0	0	100	95-100	85-100	70-90	20-30	NP-9
	45-80	Stratified loamy very fine sand to silt loam	CL-ML, CL, ML	A-4	0	0	100	95-100	60-100	60-95	20-30	NP-9
196E:												
Frohling--------	0-7	Fine sandy loam	SM	A-4	0-2	0-8	90-100	85-100	55-85	30-50	0-20	NP-4
	7-16	Fine sandy loam, sandy loam	SM	A-2-4, A-4	0-2	0-8	90-100	85-100	50-85	25-50	0-20	NP-4
	16-80	Fine sandy loam, sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-100	40-85	10-50	0-30	NP-9
Onota-----------	0-2	Gravelly sandy loam	SM	A-2	0	0-15	70-90	65-85	40-60	20-35	0-20	NP-4
	2-7	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-20	NP-4
	7-22	Gravelly sandy loam, sandy loam, gravelly loamy sand	SM	A-2-4	0	0-15	70-100	65-95	30-65	10-35	0-20	NP-4
	22-32	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
196E:												
Tokiahok--------	0-11	Loamy fine sand	SM	A-4	0	0-3	90-100	85-100	75-95	30-50	---	NP
	11-24	Loamy sand, loamy fine sand, sand	SP-SM, SM	A-4, A-3, A-2-4	0	0-3	90-100	85-100	40-95	5-50	---	NP
	24-49	Loamy sand, fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	40-85	10-50	0-25	NP-7
	49-59	Fine sandy loam, sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-25	NP-7
	59-80	Sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-2	0-8	90-100	85-95	50-85	25-50	0-20	NP-4
197B:												
Shoepac---------	0-6	Silt loam	ML	A-4	0-3	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	6-23	Fine sandy loam, very fine sandy loam	SM, ML	A-4	0-3	0-5	95-100	90-100	50-95	25-65	0-20	NP-4
	23-53	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-5	85-100	80-100	40-80	10-50	20-30	NP-9
	53-80	Sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-3	0-15	70-90	65-85	45-75	15-50	0-20	NP-4
Trenary---------	0-5	Silt loam	ML	A-4	0-3	0-8	90-100	85-100	80-100	65-90	0-20	NP-4
	5-15	Very fine sandy loam, fine sandy loam, sandy loam	ML, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	55-95	25-65	0-20	NP-4
	15-48	Fine sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0-3	0-8	90-100	85-100	40-80	10-50	20-30	NP-11
	48-80	Cobbly fine sandy loam, fine sandy loam	SM, SC-SM	A-4	0-3	0-20	70-95	65-90	50-80	30-50	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
198B:												
Shoepac---------	0-6	Silt loam	ML	A-4	0-3	0-5	95-100	90-100	80-100	65-90	0-20	NP-4
	6-23	Fine sandy loam, very fine sandy loam	SM, ML	A-4	0-3	0-5	95-100	90-100	50-95	25-65	0-20	NP-4
	23-53	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM	A-2-4, A-4	0-3	0-5	85-100	80-100	40-80	10-50	20-30	NP-9
	53-80	Sandy loam, gravelly fine sandy loam	SM	A-2-4, A-4	0-3	0-15	70-90	65-85	45-75	15-50	0-20	NP-4
Reade-----------	0-7	Silt loam	ML	A-4	0-3	0-10	95-100	90-100	75-95	50-65	0-20	NP-4
	7-15	Very fine sandy loam, fine sandy loam	SM, ML	A-4	0-3	0-10	95-100	90-100	50-90	30-60	0-20	NP-4
	15-28	Loamy fine sand, fine sandy loam, gravelly fine sandy loam	SM	A-4	0-3	0-10	80-100	75-100	50-90	30-50	0-20	NP-4
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
199.												
Udorthents, ash												
200A:												
Charlevoix------	0-8	Silt loam	ML	A-4	0-3	0-8	90-100	85-100	75-100	55-90	0-20	NP-4
	8-12	Very fine sandy loam, fine sandy loam, silt loam	SM, ML	A-4	0-3	0-8	90-100	85-100	55-95	30-65	0-20	NP-4
	12-28	Fine sandy loam, sandy clay loam	SC, SC-SM, SM	A-2-6, A-4	0-3	0-8	90-100	85-100	55-90	30-55	20-30	NP-11
	28-70	Gravelly fine sandy loam, cobbly fine sandy loam	SM	A-4	0-3	0-15	75-100	70-100	45-80	25-50	0-20	NP-4
	70-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
200A:												
Ensley----------	0-5	Muck	PT	A-8	---	---	---	---	---	---	---	---
	5-19	Sandy loam, fine sandy loam	SM, ML	A-2-4, A-4	0-3	0-8	90-100	85-100	50-95	25-75	0-25	NP-7
	19-70	Loam, gravelly fine sandy loam	SC-SM, SM	A-4	0-3	0-15	65-90	60-85	45-75	25-50	0-20	NP-4
	70-80	Bedrock	---	---	---	---	---	---	---	---	---	---
201B:												
Sauxhead--------	0-4	Sandy loam	SM	A-2-4	0	0-8	90-100	85-95	50-70	25-40	0-20	NP-4
	4-14	Very channery loamy sand, very channery sand	GM, SW	A-1	0-3	0-15	35-55	30-50	15-40	0-15	---	NP
	14-17	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
	17-27	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Jacobsville-----	0-4	Muck	PT	A-8	0-5	---	---	---	---	---	---	---
	4-9	Loam, gravelly sandy loam, fine sandy loam	ML, SM	A-2-4, A-4	0-5	0-15	80-100	75-95	45-95	20-75	0-20	NP-4
	9-16	Sandy loam, fine sandy loam, gravelly sandy loam	SM	A-1-b, A-2-4, A-4	0-3	0-15	80-100	75-95	45-85	20-50	0-25	NP-7
	16-28	Sandy loam, gravelly sandy loam	SM	A-2-4	0-3	0-5	90-100	85-95	45-70	20-40	0-25	NP-7
	28-38	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
202B:												
Sauxhead--------	0-4	Sandy loam	SM	A-2-4	0	0-8	90-100	85-95	50-70	25-40	0-20	NP-4
	4-14	Very channery loamy sand, very channery sand	GM, SW	A-1	0-3	0-15	35-55	30-50	15-40	0-15	---	NP
	14-17	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
	17-27	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
203A:												
Au Gres---------	0-8	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-70	0-15	---	NP
	8-27	Sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-75	0-30	---	NP
	27-80	Sand	SP, SP-SM	A-2-4, A-3	0	0	100	95-100	50-70	0-15	---	NP
Deford----------	0-6	Muck	PT	A-8	0	0	---	---	---	---	---	---
	6-80	Sand, loamy sand	SP, SP-SM, SM	A-2-4, A-3	0	0	95-100	90-100	45-75	0-35	---	NP
204B:												
Gogebic---------	0-5	Cobbly silt loam	ML	A-4	5-10	10-20	75-95	70-90	65-90	55-85	0-20	NP-4
	5-18	Cobbly sandy loam, very fine sandy loam, cobbly fine sandy loam	ML, SM	A-2-4, A-4	0-10	1-20	75-100	70-95	50-90	25-60	0-20	NP-4
	18-62	Very gravelly loamy sand, cobbly sandy loam, very gravelly sandy loam	SM	A-1-b, A-2-4	0-15	8-30	50-70	45-65	30-60	10-40	0-25	NP-7
	62-80	Very gravelly sandy loam, gravelly sandy loam	SM	A-2-4	0-15	8-30	50-70	45-65	35-60	10-30	0-20	NP-4

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
204B:												
Tula------------	0-8	Cobbly very fine sandy loam	SM, ML	A-4	0-8	8-30	80-100	75-95	70-95	40-65	0-20	NP-4
	8-20	Cobbly very fine sandy loam, cobbly fine sandy loam	ML, SM	A-4	0-8	8-30	80-100	75-95	55-85	30-65	0-20	NP-4
	20-28	Gravelly sandy loam, gravelly fine sandy loam	SM	A-2-4	0-8	5-10	75-85	70-80	45-75	20-50	0-20	NP-4
	28-62	Gravelly sandy loam, gravelly loam, gravelly loamy sand	SM, CL-ML	A-2-4, A-4	0-8	5-10	65-90	60-85	30-80	10-65	0-25	NP-7
	62-80	Gravelly sandy loam	SM	A-4, A-2-4	0-8	5-10	65-90	60-85	35-60	15-36	0-20	NP-4
206B:												
Traunik---------	0-4	Gravelly fine sandy loam	SM	A-4	0	0-15	80-90	75-85	45-75	25-50	0-20	NP-4
	4-11	Gravelly fine sandy loam, cobbly sandy loam	SM	A-2-4, A-4	0	0-20	70-90	65-85	40-75	20-50	0-20	NP-4
	11-31	Very gravelly sand, very cobbly loamy sand, cobbly sand	GP, GP-GM, SP	A-1, A-3	0	0-30	40-85	35-80	15-55	0-25	---	NP
	31-80	Very gravelly sand, gravelly sand, very cobbly sand	GW, SW	A-1	0	0-30	40-55	35-50	15-50	0-10	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
207D:												
Dishno----------	0-9	Cobbly silt loam	ML	A-4	---	10-20	85-95	80-90	75-90	55-75	0-20	NP-4
	9-22	Cobbly loam, cobbly fine sandy loam, fine sandy loam	ML, SM	A-4	---	0-20	85-100	80-95	55-85	30-60	0-20	NP-4
	22-46	Very stony loamy sand, gravelly loamy sand	SM	A-2-4	---	0-15	50-80	45-75	30-65	10-25	---	NP
	46-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly fine sandy loam, cobbly silt loam, gravelly fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop----	0-80	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
208F:												
Keewaydin-------	0-4	Cobbly fine sandy loam	SM	A-4	0-5	10-30	80-95	75-90	55-80	30-50	0-20	NP-4
	4-10	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-90	0-20	NP-4
	10-20	Fine sandy loam, cobbly silt loam	ML, SM	A-4	0-5	0-30	85-100	80-95	55-95	30-85	0-20	NP-4
	20-31	Gravelly loamy sand, cobbly loamy sand, gravelly sand	SP-SM, SP, SM	A-2-4, A-3	0-5	0-30	75-90	70-85	30-65	0-25	---	NP
	31-80	Very cobbly loamy sand, very gravelly sand, gravelly loamy sand	GP, GP-GM, SP-SM, SM	A-1, A-2-4, A-3	0-15	5-45	50-80	45-75	30-65	0-25	---	NP
Michigamme------	0-5	Cobbly fine sandy loam	SM	A-4	0-8	15-30	85-95	80-90	55-80	30-50	0-20	NP-4
	5-24	Cobbly silt loam, cobbly fine sandy loam, gravelly fine sandy loam, fine sandy loam	ML, SM	A-4	0-8	0-30	85-100	80-95	45-95	25-85	0-20	NP-4
	24-29	Cobbly fine sandy loam, gravelly fine sandy loam	SM	A-4	0-8	0-30	85-95	80-90	45-80	25-50	0-20	NP-4
	29-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
209B:												
Garlic----------	0-9	Fine sand	SM	A-2-4	0	0	95-100	90-100	70-95	15-35	---	NP
	9-26	Fine sand, sand	SP, SP-SM, SM	A-3, A-2-4	0	0	95-100	90-100	45-95	0-35	---	NP
	26-80	Fine sand, sand	SP, SP-SM, SM	A-3, A-2-4	0	0	95-100	90-100	45-95	0-35	---	NP

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
209B:												
Fence-----------	0-3	Very fine sandy loam	ML	A-4	0	0	100	95-100	85-100	70-90	0-20	NP-4
	3-7	Silt loam, very fine sandy loam	ML	A-4	0	0	100	95-100	80-100	70-90	0-20	NP-4
	7-19	Silt loam, very fine sandy loam, loamy very fine sand	ML	A-4	0	0	100	95-100	80-100	60-90	0-20	NP-4
	19-42	Silt loam, very fine sandy loam	CL-ML, ML	A-4	0	0	100	95-100	85-100	70-90	20-30	NP-11
	42-80	Stratified very fine sand to silt	SM, ML	A-4	0	0	100	95-100	50-95	30-90	0-25	NP-7
M-W. Miscellaneous water												
W. Water												

Table 18.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
10B:												
Grayling------------	0-3	0-5	1.30-1.65	6-20	0.07-0.09	0.0-2.9	1.0-6.0	.15	.15	5	1	220
	3-23	0-5	1.30-1.65	6-20	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-80	0-5	1.45-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
10D:												
Grayling------------	0-3	0-5	1.30-1.65	6-20	0.07-0.09	0.0-2.9	1.0-6.0	.15	.15	5	1	220
	3-23	0-5	1.30-1.65	6-20	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-80	0-5	1.45-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
10E:												
Grayling------------	0-3	0-5	1.30-1.65	6-20	0.07-0.09	0.0-2.9	1.0-6.0	.15	.15	5	1	220
	3-23	0-5	1.30-1.65	6-20	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-80	0-5	1.45-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
11C:												
Deer Park-----------	0-3	0-5	1.30-1.55	6-20	0.04-0.07	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	3-11	0-5	1.40-1.60	6-20	0.03-0.06	0.0-2.9	0.0-0.0	.15	.15			
	11-80	0-5	1.40-1.55	6-20	0.03-0.05	0.0-2.9	0.0-0.0	.15	.15			
11D:												
Deer Park-----------	0-3	0-5	1.30-1.55	6-20	0.04-0.07	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	3-11	0-5	1.40-1.60	6-20	0.03-0.06	0.0-2.9	0.0-0.0	.15	.15			
	11-80	0-5	1.40-1.55	6-20	0.03-0.05	0.0-2.9	0.0-0.0	.15	.15			
12B:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
12D:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
12E:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
12F:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
13B:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
13D:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
13E:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
13F:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
14B:												
Rousseau------------	0-6	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	6-27	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	0.6-1.0	.15	.15			
	27-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
14D:												
Rousseau------------	0-6	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	6-27	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	0.6-1.0	.15	.15			
	27-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
15A:												
Croswell------------	0-7	0-5	1.30-1.55	6-20	0.06-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-34	0-5	1.40-1.60	6-20	0.06-0.10	0.0-2.9	0.6-1.0	.10	.15			
	34-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
16A:												
Paquin--------------	0-11	0-5	1.35-1.45	6-20	0.06-0.10	0.0-2.9	0.0-1.0	.15	.15	2	1	220
	11-12	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.0-2.0	.15	.15			
	12-14	0-5	1.75-2.00	0.6-6	0.05-0.06	0.0-2.9	0.6-2.0	.15	.15			
	14-36	0-5	1.45-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	36-80	0-5	1.50-1.70	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
17A:												
Au Gres-------------	0-8	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	2.0-4.0	.10	.15	5	1	220
	8-27	0-5	1.50-1.70	6-20	0.06-0.09	0.0-2.9	0.6-1.0	.10	.15			
	27-80	0-5	1.50-1.70	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
18:												
Kinross-------------	0-5	0-0	0.10-0.35	2-20	0.35-0.45	---	20-70	---	---	3	2	134
	5-30	0-5	1.40-1.70	6-20	0.04-0.09	0.0-2.9	1.0-4.0	.15	.15			
	30-80	0-5	1.40-1.70	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
19:												
Deford--------------	0-6	---	0.30-0.50	0.2-6	0.35-0.45	---	40-60	---	---	5	2	134
	6-80	0-5	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			
20B:												
Rousseau------------	0-6	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	6-27	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	0.6-1.0	.15	.15			
	27-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Ocqueoc-------------	0-2	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	4	1	220
	2-7	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.5-1.0	.15	.15			
	7-27	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.15			
	27-80	5-15	1.50-1.80	0.2-0.6	0.05-0.21	0.0-2.9	0.0-0.5	.37	.37			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
20D:												
Rousseau------------	0-6	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	6-27	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	0.6-1.0	.15	.15			
	27-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Ocqueoc-------------	0-2	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	4	1	220
	2-7	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.5-1.0	.15	.15			
	7-27	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.15			
	27-80	5-15	1.50-1.80	0.2-0.6	0.05-0.21	0.0-2.9	0.0-0.5	.37	.37			
20E:												
Rousseau------------	0-6	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	6-27	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	0.6-1.0	.15	.15			
	27-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
Ocqueoc-------------	0-2	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	4	1	220
	2-7	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.5-1.0	.15	.15			
	7-27	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.15			
	27-80	5-15	1.50-1.80	0.2-0.6	0.05-0.21	0.0-2.9	0.0-0.5	.37	.37			
22B:												
Alcona--------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
24B:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
24D:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
25B:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
25D:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
26A:												
Skanee--------------	0-7	2-10	1.30-1.60	0.6-2	0.09-0.18	0.0-2.9	2.0-3.0	.24	.24	3	3	86
	7-12	2-8	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.6-1.0	.24	.24			
	12-30	10-14	1.75-2.10	0.0-0.06	0.04-0.06	0.0-2.9	0.0-0.5	.24	.24			
	30-80	4-12	1.40-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
27:												
Gay-----------------	0-2	0-10	0.90-1.60	0.2-6	0.35-0.45	0.0-2.9	55-75	.24	.24	2	2	134
	2-18	5-12	1.15-1.60	0.6-2	0.07-0.14	0.0-2.9	0.0-0.5	.24	.24			
	18-31	5-15	1.30-1.80	0.6-2	0.10-0.18	0.0-2.9	0.0-0.5	.24	.24			
	31-80	4-12	1.80-1.95	0.6-2	0.09-0.17	0.0-2.9	0.0-0.5	.24	.24			
28B:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
28D:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
28E:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
29B:												
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-10	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
29D:												
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
31D:												
Trenary-------------	0-5	2-10	1.35-1.55	0.6-2	0.18-0.22	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	5-15	2-10	1.35-1.60	0.6-2	0.14-0.19	0.0-2.9	0.5-1.0	.24	.24			
	15-48	10-20	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.0-0.5	.24	.24			
	48-80	7-11	1.60-1.80	0.6-2	0.09-0.19	0.0-2.9	0.0-0.5	.28	.28			
32A:												
Charlevoix----------	0-8	2-10	1.30-1.65	0.6-2	0.12-0.18	0.0-2.9	2.0-3.0	.24	.24	5	3	86
	8-12	2-10	1.35-1.65	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
	12-28	10-25	1.40-1.70	0.6-2	0.12-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.55-1.70	0.6-2	0.06-0.12	0.0-2.9	---	.32	.32			
33:												
Ensley--------------	0-5	---	0.30-0.55	0.2-6	0.35-0.45	---	55-75	---	---	4	2	134
	5-19	5-15	1.30-1.70	0.6-2	0.11-0.18	0.0-2.9	0.0-0.5	.24	.37			
	19-80	7-11	1.70-1.80	0.6-2	0.10-0.14	0.0-2.9	0.0-0.5	.20	.28			
34B:												
Onaway--------------	0-6	2-10	1.30-1.55	0.6-2	0.08-0.16	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	6-13	2-10	1.40-1.70	0.6-2	0.12-0.17	0.0-2.9	---	.24	.24			
	13-18	18-30	1.40-1.70	0.2-0.6	0.12-0.19	0.0-2.9	---	.32	.32			
	18-80	7-11	1.60-1.80	0.2-0.6	0.10-0.20	0.0-2.9	---	.32	.43			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
34D:												
Onaway--------------	0-6	2-8	1.30-1.55	0.6-2	0.08-0.16	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	6-13	2-8	1.40-1.70	0.6-2	0.12-0.17	0.0-2.9	---	.24	.24			
	13-18	18-30	1.40-1.70	0.2-0.6	0.12-0.19	0.0-2.9	---	.32	.32			
	18-80	7-11	1.60-1.80	0.2-0.6	0.10-0.20	0.0-2.9	---	.32	.43			
34E:												
Onaway--------------	0-6	2-8	1.30-1.55	0.6-2	0.08-0.16	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	6-13	2-8	1.40-1.70	0.6-2	0.12-0.17	0.0-2.9	---	.24	.24			
	13-18	18-30	1.40-1.70	0.2-0.6	0.12-0.19	0.0-2.9	---	.32	.32			
	18-80	7-11	1.60-1.80	0.2-0.6	0.10-0.20	0.0-2.9	---	.32	.43			
35B:												
Champion------------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-3.0	.17	.37	4	3	86
	5-26	2-8	1.25-1.65	0.6-2	0.10-0.20	0.0-2.9	0.6-1.0	.24	.43			
	26-43	1-10	1.80-2.05	0.0-0.06	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
	43-80	1-10	1.30-1.65	2-6	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
35D:												
Champion------------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-3.0	.17	.37	4	3	86
	5-26	2-8	1.25-1.65	0.6-2	0.10-0.20	0.0-2.9	0.6-1.0	.24	.43			
	26-43	1-10	1.80-2.05	0.0-0.06	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
	43-80	1-10	1.30-1.65	2-6	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
36A:												
Net-----------------	0-5	2-8	1.30-1.60	0.6-2	0.08-0.12	0.0-2.9	2.0-6.0	.17	---	4	8	0
	5-18	2-8	1.40-1.65	0.6-2	0.09-0.21	0.0-2.9	0.6-1.0	.28	.37			
	18-45	1-10	1.80-2.05	0.0-0.06	0.01-0.02	0.0-2.9	0.0-0.5	.20	.28			
	45-80	1-10	1.30-1.70	0.6-2	0.01-0.02	0.0-2.9	0.0-0.5	.20	.28			
37:												
Witbeck-------------	0-8	---	0.15-0.40	0.2-6	0.35-0.45	0.0-2.9	40-70	---	---	5	8	0
	8-15	3-10	1.25-1.60	0.6-2	0.08-0.16	0.0-2.9	0.0-1.0	.20	.28			
	15-22	3-10	1.55-1.75	0.6-2	0.04-0.18	0.0-2.9	0.0-0.5	.24	.32			
	22-80	3-10	1.55-1.75	0.2-2	0.04-0.17	0.0-2.9	0.0-0.5	.24	.32			
38B:												
Pence---------------	0-6	2-8	1.20-1.65	2-6	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-13	2-8	1.35-1.45	2-6	0.10-0.15	0.0-2.9	1.0-2.0	.17	.24			
	13-31	0-5	1.65-1.75	6-60	0.05-0.08	0.0-2.9	0.0-0.5	.05	.10			
	31-80	0-4	1.35-1.80	6-60	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
38D:												
Pence---------------	0-6	2-8	1.20-1.65	2-6	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-13	2-8	1.35-1.45	2-6	0.10-0.15	0.0-2.9	1.0-2.0	.17	.24			
	13-31	0-5	1.65-1.75	6-60	0.05-0.08	0.0-2.9	0.0-0.5	.05	.10			
	31-80	0-4	1.35-1.80	6-60	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
38E:												
Pence---------------	0-6	2-8	1.20-1.65	2-6	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-13	2-8	1.35-1.45	2-6	0.10-0.15	0.0-2.9	1.0-2.0	.17	.24			
	13-31	0-5	1.65-1.75	6-60	0.05-0.08	0.0-2.9	0.0-0.5	.05	.10			
	31-80	0-4	1.35-1.80	6-60	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
39B:												
Amasa---------------	0-5	2-8	1.20-1.60	0.6-2	0.15-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	5-16	2-8	1.20-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.37	.37			
	16-80	0-3	1.50-1.65	6-20	0.02-0.04	0.0-2.9	---	.10	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
39D:												
Amasa---------------	0-5	2-8	1.20-1.60	0.6-2	0.15-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	5-16	2-8	1.20-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.37	.37			
	16-80	0-3	1.50-1.65	6-20	0.02-0.04	0.0-2.9	---	.10	.15			
39E:												
Amasa---------------	0-5	2-8	1.20-1.60	0.6-2	0.15-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	5-16	2-8	1.20-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.37	.37			
	16-80	0-3	1.50-1.65	6-20	0.02-0.04	0.0-2.9	---	.10	.15			
40B:												
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
40D:												
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
41A:												
Channing------------	0-9	2-8	1.10-1.65	0.6-2	0.12-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	9-22	2-8	1.25-1.70	0.6-2	0.11-0.16	0.0-2.9	---	.24	.24			
	22-80	0-3	1.50-1.65	20-20	0.02-0.04	0.0-2.9	---	.10	.15			
42:												
Minocqua------------	0-5	0-0	0.15-0.45	2-6	0.35-0.45	0.0-2.9	30-60	.10	.10	4	2	134
	5-23	3-12	1.50-1.60	0.6-2	0.11-0.19	0.0-2.9	0.5-2.0	.43	.43			
	23-80	0-3	1.75-1.85	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
43B:												
Karlin--------------	0-4	2-8	1.35-1.60	2-6	0.15-0.17	0.0-2.9	1.0-2.0	.20	.24	4	3	86
	4-15	2-8	1.35-1.60	2-6	0.08-0.16	0.0-2.9	0.6-1.0	.15	.17			
	15-29	0-5	1.40-1.65	6-20	0.03-0.08	0.0-2.9	0.0-0.5	.15	.17			
	29-80	0-5	1.40-1.70	6-20	0.03-0.04	0.0-2.9	0.0-0.5	.10	.15			
43D:												
Karlin--------------	0-4	2-8	1.35-1.60	2-6	0.15-0.17	0.0-2.9	1.0-2.0	.20	.24	4	3	86
	4-15	2-8	1.35-1.60	2-6	0.08-0.16	0.0-2.9	0.6-1.0	.15	.17			
	15-29	0-5	1.40-1.65	6-20	0.03-0.08	0.0-2.9	0.0-0.5	.15	.17			
	29-80	0-5	1.40-1.70	6-20	0.03-0.04	0.0-2.9	0.0-0.5	.10	.15			
44B:												
Carlshend-----------	0-3	2-8	1.30-1.60	0.6-2	0.10-0.13	0.0-2.9	0.5-3.0	.24	.24	1	3	86
	3-14	2-8	1.35-1.65	0.6-2	0.11-0.15	0.0-2.9	0.6-1.0	.24	.24			
	14-25	---	---	0.2-0.6	---	---	---	---	---			
	25-35	---	---	0.02-0.2	---	---	---	---	---			
45A:												
Zeba----------------	0-14	2-8	1.30-1.70	0.6-2	0.07-0.18	0.0-2.9	2.0-4.0	.17	.17	2	3	86
	14-31	5-15	1.40-1.80	0.6-2	0.07-0.18	0.0-2.9	0.0-0.5	.17	.17			
	31-41	---	---	0.2-2	---	---	---	---	---			
46:												
Jacobsville---------	0-4	0-0	0.30-0.40	0.6-6	0.35-0.45	---	40-60	---	---	2	2	134
	4-9	2-8	1.30-1.60	0.6-2	0.09-0.15	0.0-2.9	0.0-1.0	.24	.24			
	9-16	5-15	1.30-1.60	0.6-2	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	16-28	3-12	1.30-1.60	0.6-2	0.05-0.11	0.0-2.9	0.0-0.5	.20	.28			
	28-38	---	---	0.2-2	---	---	---	---	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
48:												
Burt----------------	0-7	0-0	1.30-1.60	6-20	0.09-0.12	0.0-2.9	10-20	.15	.15	1	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.0-0.5	.15	.15			
	18-28	---	---	0.2-2	---	---	---	---	---			
50A:												
Sundell-------------	0-8	2-10	1.30-1.50	0.6-2	0.15-0.22	0.0-2.9	5.0-10	.32	.32	2	5	56
	8-17	2-10	1.30-1.50	0.6-2	0.08-0.15	0.0-2.9	---	.24	.24			
	17-22	7-11	1.35-1.70	0.6-2	0.11-0.19	0.0-2.9	---	.24	.24			
	22-40	---	---	0.06-0.6	---	---	---	---	---			
51:												
Nahma---------------	0-11	0-0	0.30-0.40	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	11-14	8-15	1.30-1.60	0.6-2	0.12-0.20	0.0-2.9	---	.24	.24			
	14-24	8-15	1.40-1.70	0.6-2	0.10-0.19	0.0-2.9	---	.24	.24			
	24-34	---	---	0.06-0.6	---	---	---	---	---			
52B:												
Summerville---------	0-5	2-8	1.30-1.60	0.6-2	0.08-0.18	0.0-2.9	1.0-2.0	.24	.24	1	3	86
	5-13	5-10	1.35-1.65	0.6-2	0.10-0.16	0.0-2.9	0.0-0.5	.24	.24			
	13-23	---	---	0.06-0.6	---	---	---	---	---			
55F:												
Michigamme----------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-4.0	.17	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.07-0.22	0.0-2.9	0.6-1.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
56D:												
Peshekee------------	0-5	2-8	1.10-1.60	0.6-2	0.09-0.24	0.0-2.9	1.0-3.0	.28	.37	1	8	0
	5-14	2-8	1.20-1.60	0.6-2	0.08-0.22	0.0-2.9	0.6-1.0	.28	.37			
	14-24	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
56E:												
Peshekee------------	0-5	2-8	1.10-1.60	0.6-2	0.09-0.24	0.0-2.9	1.0-3.0	.28	.37	1	8	0
	5-14	2-8	1.20-1.60	0.6-2	0.08-0.22	0.0-2.9	0.6-1.0	.28	.37			
	14-24	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
56F:												
Peshekee------------	0-5	2-8	1.10-1.60	0.6-2	0.09-0.24	0.0-2.9	1.0-3.0	.28	.37	1	8	0
	5-14	2-8	1.20-1.60	0.6-2	0.08-0.22	0.0-2.9	0.6-1.0	.28	.37			
	14-24	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
57:												
Carbondale----------	0-6	0-0	0.30-0.40	0.2-6	0.35-0.45	---	50-70	---	---	3	2	134
	6-38	0-0	0.13-0.23	0.2-6	0.35-0.45	---	50-70	---	---			
	38-80	0-0	0.10-0.17	0.6-6	0.45-0.55	---	50-70	---	---			
Tawas---------------	0-6	---	0.30-0.55	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	6-25	---	0.30-0.55	0.2-6	0.24-0.45	---	40-60	---	---			
	25-80	0-5	1.40-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.0	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
58:												
Greenwood-----------	0-8	0-0	0.30-0.40	6-20	0.55-0.65	---	55-75	---	---	3	7	38
	8-80	0-0	0.10-0.25	0.2-6	0.45-0.55	---	55-75	---	---			
Dawson-------------	0-6	0-0	0.15-0.30	6-20	0.55-0.65	---	65-85	---	---	2	7	38
	6-34	0-0	0.15-0.40	0.2-6	0.35-0.45	---	65-85	---	---			
	34-36	0-5	1.55-1.75	0.6-2	0.18-0.20	0.0-2.9	5.0-15	.24	.24			
	36-80	0-5	1.55-1.75	6-20	0.03-0.10	0.0-2.9	0.0-0.5	.10	.15			
59:												
Chippeny-----------	0-29	0-0	0.15-0.30	0.2-0.6	0.35-0.45	---	55-75	---	---	1	2	134
	29-38	7-11	1.45-1.75	0.2-2	0.04-0.19	0.0-2.9	---	---	---			
	38-48	---	---	0.06-0.6	---	---	---	---	---			
Nahma--------------	0-11	0-0	0.30-0.40	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	11-14	8-15	1.30-1.60	0.6-2	0.12-0.20	0.0-2.9	---	.24	.24			
	14-24	8-15	1.40-1.70	0.6-2	0.10-0.19	0.0-2.9	---	.24	.24			
	24-34	---	---	0.06-0.6	---	---	---	---	---			
60:												
Histosols-----------	0-51	---	---	0.2-6	---	---	50-70	---	---	3	2	134
	51-80	---	---	0.01-0.02	---	---	---	---	---			
Aquents------------	0-80	---	---	0.02-0.02	---	---	---	---	---	5	---	---
61.												
Pits, borrow												
62B:												
Udorthents----------	0-60	2-18	1.50-1.70	0.6-2	0.11-0.18	0.0-2.9	---	.24	---	5	3	86
	60-80	---	---	0.6-2	---	---	---	---	---			
Udipsamments--------	0-80	0-5	1.35-1.65	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
64.												
Pits and Dumps												
65B:												
Udorthents----------	0-60	2-18	1.50-1.70	0.6-2	0.11-0.18	0.0-2.9	---	.24	---	5	3	86
	60-80	---	---	0.6-2	---	---	---	---	---			
Urban land.												
66B:												
Udipsamments--------	0-80	0-5	1.35-1.65	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
Urban land.												
67B:												
Urban land.												
Rubicon------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
68:												
Pits, quarries------	0-80	---	---	0.01-20	---	---	---	---	---	5	8	0

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
69B:												
Escanaba	0-6	0-5	1.35-1.65	2-6	0.09-0.12	0.0-2.9	0.5-3.0	.17	.17	5	2	134
	6-26	0-5	1.30-1.65	2-6	0.08-0.11	0.0-2.9	0.0-0.5	.17	.17			
	26-35	2-8	1.30-1.65	0.6-2	0.09-0.11	0.0-2.9	0.0-0.5	.17	.17			
	35-42	5-15	1.30-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.5	.28	.28			
	42-80	7-11	1.60-1.80	0.6-2	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
69D:												
Escanaba	0-6	0-5	1.35-1.65	2-6	0.09-0.12	0.0-2.9	0.5-3.0	.17	.17	5	2	134
	6-26	0-5	1.30-1.65	2-6	0.08-0.11	0.0-2.9	0.0-0.5	.17	.17			
	26-35	2-8	1.30-1.65	0.6-2	0.09-0.11	0.0-2.9	0.0-0.5	.17	.17			
	35-42	5-15	1.30-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.5	.28	.28			
	42-80	7-11	1.60-1.80	0.6-2	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
70B:												
Nadeau	0-7	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-17	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.20	.24			
	17-23	8-18	1.35-1.60	0.6-2	0.04-0.09	0.0-2.9	0.0-0.5	.10	.24			
	23-80	0-2	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			
70D:												
Nadeau	0-7	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-17	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.20	.24			
	17-23	8-18	1.35-1.60	0.6-2	0.04-0.09	0.0-2.9	0.0-0.5	.10	.24			
	23-80	0-2	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			
71B:												
Evart	0-10	2-8	1.35-1.50	0.6-2	0.19-0.22	0.0-2.9	1.0-6.0	.28	.28	3	5	56
	10-80	0-5	1.40-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.0	.15	.20			
Pelkie	0-7	0-5	1.30-1.55	6-20	0.08-0.12	0.0-2.9	1.0-2.0	.17	.17	5	2	134
	7-80	0-5	1.25-1.65	6-20	0.05-0.09	0.0-2.9	---	.15	.15			
Sturgeon	0-6	2-8	1.40-1.65	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.37	.37	4	3	86
	6-35	2-8	1.50-1.70	0.6-2	0.10-0.22	0.0-2.9	---	.28	.28			
	35-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	---	.15	.15			
72B:												
Emmet	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
72D:												
Emmet	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
72E:												
Emmet	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
73B:												
Gogebic	0-5	2-8	1.25-1.65	0.6-2	0.08-0.15	0.0-2.9	1.0-3.0	.17	.24	3	3	86
	5-18	2-8	1.25-1.65	0.6-2	0.08-0.14	0.0-2.9	0.5-1.0	.17	.24			
	18-62	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
	62-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
73D:												
Gogebic-------------	0-5	2-8	1.25-1.65	0.6-2	0.08-0.15	0.0-2.9	1.0-3.0	.17	.24	3	3	86
	5-18	2-8	1.25-1.65	0.6-2	0.08-0.14	0.0-2.9	0.5-1.0	.17	.24			
	18-62	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
	62-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
74D:												
Schweitzer----------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.16	0.0-2.9	1.0-3.0	.28	.37	4	8	0
	5-21	2-8	1.35-1.70	0.6-2	0.12-0.16	0.0-2.9	0.0-0.0	.32	.43			
	21-43	2-10	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	43-61	5-15	1.30-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	61-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
Michigamme----------	0-5	2-8	1.25-1.60	0.6-2	0.11-0.18	0.0-2.9	1.0-4.0	.28	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.06-0.22	0.0-2.9	0.6-2.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	---	---	---	---	---	---	-	---	
74F:												
Schweitzer----------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.16	0.0-2.9	1.0-3.0	.28	.37	4	8	0
	5-21	2-8	1.35-1.70	0.6-2	0.12-0.16	0.0-2.9	0.0-0.0	.32	.43			
	21-43	2-10	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	43-61	5-15	1.30-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	61-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
Michigamme----------	0-5	2-8	1.25-1.60	0.6-2	0.11-0.18	0.0-2.9	1.0-4.0	.28	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.06-0.22	0.0-2.9	0.6-2.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	---	---	---	---	---	---	-	---	
76C:												
Garlic--------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Alcona--------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
Voelker-------------	0-11	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	250
	11-15	0-5	1.60-1.90	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	15-31	0-5	1.75-2.00	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	31-39	0-10	1.35-1.70	0.2-0.6	0.09-0.19	0.0-2.9	0.0-0.0	.28	.28			
	39-80	0-15	1.55-1.75	0.2-0.6	0.05-0.22	0.0-2.9	0.0-0.0	.28	.28			
76E:												
Garlic--------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Alcona--------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
76E:												
Voelker--------------	0-11	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	250
	11-15	0-5	1.60-1.90	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	15-31	0-5	1.75-2.00	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	31-39	0-10	1.35-1.70	0.2-0.6	0.09-0.19	0.0-2.9	0.0-0.0	.28	.28			
	39-80	0-15	1.55-1.75	0.2-0.6	0.05-0.22	0.0-2.9	0.0-0.0	.28	.28			
76F:												
Garlic---------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Alcona---------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
Voelker--------------	0-11	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	250
	11-15	0-5	1.60-1.90	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	15-31	0-5	1.75-2.00	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	31-39	0-10	1.35-1.70	0.2-0.6	0.09-0.19	0.0-2.9	0.0-0.0	.28	.28			
	39-80	0-15	1.55-1.75	0.2-0.6	0.05-0.22	0.0-2.9	0.0-0.0	.28	.28			
77D:												
Garlic---------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Alcona---------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
Voelker--------------	0-11	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	250
	11-15	0-5	1.60-1.90	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	15-31	0-5	1.75-2.00	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	31-39	0-10	1.35-1.70	0.2-0.6	0.09-0.19	0.0-2.9	0.0-0.0	.28	.28			
	39-80	0-15	1.55-1.75	0.2-0.6	0.05-0.22	0.0-2.9	0.0-0.0	.28	.28			
77E:												
Garlic---------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Alcona---------------	0-9	2-8	1.30-1.60	0.6-2	0.10-0.14	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-13	2-8	1.35-1.70	0.6-2	0.10-0.17	0.0-2.9	---	.20	.24			
	13-26	2-8	1.35-1.70	0.6-2	0.08-0.17	0.0-2.9	---	.15	.17			
	26-49	10-20	1.35-1.70	0.6-2	0.13-0.20	0.0-2.9	---	.24	.24			
	49-80	5-15	1.50-1.70	0.6-2	0.08-0.20	0.0-2.9	---	.24	.24			
Voelker--------------	0-11	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	5	1	250
	11-15	0-5	1.60-1.90	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	15-31	0-5	1.75-2.00	0.6-6	0.06-0.11	0.0-2.9	0.0-0.0	.17	.17			
	31-39	0-10	1.35-1.70	0.2-0.6	0.09-0.19	0.0-2.9	0.0-0.0	.28	.28			
	39-80	0-15	1.55-1.75	0.2-0.6	0.05-0.22	0.0-2.9	0.0-0.0	.28	.28			
78C:												
Keweenaw-------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
78C:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
78E:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-10	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
78F:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
79B:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.17			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.17			
80B:												
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
80D:												
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
80E:												
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.55	6-20	0.04-0.11	0.0-2.9	0.5-1.0	.17	.17			
	14-27	0-4	1.35-1.65	2-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
80E:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
81B:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
81D:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
81E:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
84D:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Ishpeming-----------	0-6	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.17	.17	2	1	220
	6-24	0-5	1.30-1.70	6-20	0.06-0.11	0.0-2.9	0.5-1.0	.17	.17			
	24-38	0-5	1.30-1.70	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.17			
	38-48	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	---	---	---	---	---	---	-	---	
84F:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Ishpeming-----------	0-6	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.17	.17	2	1	220
	6-24	0-5	1.30-1.70	6-20	0.06-0.11	0.0-2.9	0.5-1.0	.17	.17			
	24-38	0-5	1.30-1.70	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.17			
	38-48	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	---	---	---	---	---	---	-	---	
85A:												
Solona--------------	0-9	2-8	1.35-1.70	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	9-25	5-15	1.45-1.65	0.6-2	0.09-0.19	0.0-2.9	0.0-0.5	.24	.24			
	25-80	7-11	1.45-1.70	0.6-2	0.08-0.19	0.0-2.9	0.0-0.5	.37	.37			
86B:												
Mashek--------------	0-3	2-8	1.30-1.60	0.6-2	0.16-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	3-17	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.1-1.5	.24	.24			
	17-27	6-15	1.35-1.70	0.6-2	0.09-0.17	0.0-2.9	0.0-0.5	.24	.24			
	27-38	10-22	1.35-1.70	0.2-0.6	0.10-0.18	0.0-2.9	0.0-0.5	.24	.32			
	38-43	7-11	1.60-1.80	0.2-0.6	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
	43-80	7-11	1.80-2.00	0.0-0.06	0.03-0.04	0.0-2.9	0.0-0.5	.20	.28			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
87B:												
Cunard--------------	0-4	5-10	1.30-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.24	.24	2	3	86
	4-19	5-18	1.35-1.70	0.6-2	0.09-0.19	0.0-2.9	---	.24	.24			
	19-27	7-11	1.60-1.70	0.6-2	0.08-0.18	0.0-2.9	---	.24	.32			
	27-37	---	---	0.06-0.6	---	---	---	---	---			
88:												
Cathro--------------	0-18	0-0	0.28-0.45	0.2-6	0.35-0.45	---	60-85	---	---	2	2	134
	18-31	0-0	0.15-0.30	0.2-6	0.35-0.45	---	60-85	.24	.32			
	31-80	5-10	1.50-1.70	0.2-0.6	0.11-0.22	0.0-2.9	0.0-0.5	.32	---			
Ensley--------------	0-5	---	0.30-0.55	0.2-6	0.35-0.45	---	55-75	---	---	4	2	134
	5-19	5-15	1.30-1.70	0.6-2	0.11-0.18	0.0-2.9	0.0-0.5	.24	.37			
	19-80	7-11	1.70-1.80	0.6-2	0.10-0.14	0.0-2.9	0.0-0.5	.20	.28			
89B:												
Emmet---------------	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
Solona--------------	0-9	2-8	1.35-1.70	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	9-25	5-15	1.45-1.65	0.6-2	0.09-0.19	0.0-2.9	0.0-0.5	.24	.24			
	25-80	7-11	1.45-1.70	0.6-2	0.08-0.19	0.0-2.9	0.0-0.5	.37	.37			
90B:												
Emmet---------------	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
Escanaba------------	0-6	0-5	1.35-1.65	2-6	0.09-0.12	0.0-2.9	0.5-3.0	.17	.17	5	2	134
	6-26	0-5	1.30-1.65	2-6	0.08-0.11	0.0-2.9	0.0-0.5	.17	.17			
	26-35	2-8	1.30-1.65	0.6-2	0.09-0.11	0.0-2.9	0.0-0.5	.17	.17			
	35-42	5-15	1.30-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.5	.28	.28			
	42-80	7-11	1.60-1.80	0.6-2	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
90D:												
Emmet---------------	0-3	2-8	1.30-1.65	0.6-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	---	.32	.32			
	28-80	7-11	1.60-1.80	0.2-0.6	0.08-0.14	0.0-2.9	---	.28	.28			
Escanaba------------	0-6	0-5	1.35-1.65	2-6	0.09-0.12	0.0-2.9	0.5-3.0	.17	.17	5	2	134
	6-26	0-5	1.30-1.65	2-6	0.08-0.11	0.0-2.9	0.0-0.5	.17	.17			
	26-35	2-8	1.30-1.65	0.6-2	0.09-0.11	0.0-2.9	0.0-0.5	.17	.17			
	35-42	5-15	1.30-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.5	.28	.28			
	42-80	7-11	1.60-1.80	0.6-2	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
91B:												
Onaway--------------	0-6	2-8	1.30-1.55	0.6-2	0.08-0.16	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	6-13	2-8	1.40-1.70	0.6-2	0.12-0.17	0.0-2.9	---	.24	.24			
	13-18	18-30	1.40-1.70	0.2-0.6	0.12-0.19	0.0-2.9	---	.32	.32			
	18-80	7-11	1.60-1.80	0.2-0.6	0.10-0.20	0.0-2.9	---	.32	.43			
Nadeau--------------	0-7	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-17	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.20	.24			
	17-23	8-18	1.35-1.60	0.6-2	0.04-0.09	0.0-2.9	0.0-0.5	.10	.24			
	23-80	0-2	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
92A:												
Ensley--------------	0-5	---	0.30-0.55	0.2-6	0.35-0.45	---	55-75	---	---	4	2	134
	5-19	5-15	1.30-1.70	0.6-2	0.11-0.18	0.0-2.9	0.0-0.5	.24	.37			
	19-80	7-11	1.70-1.80	0.6-2	0.10-0.14	0.0-2.9	0.0-0.5	.20	.28			
Solona--------------	0-9	2-8	1.35-1.70	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	9-25	5-15	1.45-1.65	0.6-2	0.09-0.19	0.0-2.9	0.0-0.5	.24	.24			
	25-80	7-11	1.45-1.70	0.6-2	0.08-0.19	0.0-2.9	0.0-0.5	.37	.37			
93:												
Tawas---------------	0-6	---	0.30-0.55	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	6-25	---	0.30-0.55	0.2-6	0.24-0.45	---	40-60	---	---			
	25-80	0-5	1.40-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.0	.15	.15			
Deford--------------	0-6	---	0.30-0.50	0.2-6	0.35-0.45	---	40-60	---	---	5	2	134
	6-80	0-5	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			
94B:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
94D:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
94E:												
Keweenaw------------	0-3	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	3-25	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	25-80	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
95B:												
Liminga-------------	0-4	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	4-30	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	1.0-2.0	.15	.15			
	30-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
95D:												
Liminga-------------	0-4	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	4-30	0-5	1.30-1.60	6-20	0.06-0.08	0.0-2.9	1.0-2.0	.15	.15			
	30-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
100E:												
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
100E:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
100F:												
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
103D:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Ocqueoc-------------	0-2	0-5	1.30-1.60	6-20	0.07-0.09	0.0-2.9	1.0-3.0	.15	.15	4	1	220
	2-7	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.5-1.0	.15	.15			
	7-27	0-5	1.30-1.60	6-20	0.06-0.12	0.0-2.9	0.0-0.5	.15	.15			
	27-80	5-15	1.50-1.80	0.2-0.6	0.05-0.21	0.0-2.9	0.0-0.5	.37	.37			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
104C:												
Fence---------------	0-3	2-8	1.35-1.55	0.6-2	0.20-0.24	0.0-2.9	1.0-2.0	.37	.37	5	5	56
	3-7	2-8	1.35-1.55	0.6-2	0.20-0.22	0.0-2.9	0.5-1.0	.37	.37			
	7-19	2-8	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	1.0-2.0	.37	.37			
	19-42	8-18	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	0.0-0.5	.43	.43			
	42-80	5-15	1.50-1.65	0.2-0.6	0.14-0.20	0.0-2.9	0.0-0.5	.43	.43			
105C:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
106B:												
Sagola--------------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.18	0.0-2.9	1.0-3.0	.20	.24	5	3	86
	5-20	2-8	1.20-1.55	0.6-2	0.08-0.17	0.0-2.9	0.1-1.0	.15	.17			
	20-56	2-15	1.20-1.55	0.6-2	0.08-0.17	0.0-2.9	0.0-0.5	.15	.17			
	56-80	2-10	1.40-1.80	0.6-2	0.08-0.13	0.0-2.9	0.0-0.5	.15	.17			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
106D:												
Sagola--------------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.18	0.0-2.9	1.0-3.0	.20	.24	5	3	86
	5-20	2-8	1.20-1.55	0.6-2	0.08-0.17	0.0-2.9	0.1-1.0	.15	.17			
	20-56	2-15	1.20-1.55	0.6-2	0.08-0.17	0.0-2.9	0.0-0.5	.15	.17			
	56-80	2-10	1.40-1.80	0.6-2	0.08-0.13	0.0-2.9	0.0-0.5	.15	.17			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
107B:												
Goodman-------------	0-4	2-8	1.45-1.60	0.6-2	0.18-0.24	0.0-2.9	0.5-1.0	.37	.37	5	5	56
	4-30	2-8	1.45-1.60	0.6-2	0.17-0.22	0.0-2.9	1.0-2.0	.37	.37			
	30-71	5-10	1.50-1.70	0.6-2	0.05-0.18	0.0-2.9	0.0-0.5	.20	.24			
	71-80	2-10	1.50-1.75	2-6	0.05-0.16	0.0-2.9	0.0-0.5	.24	.28			
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	.28			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
107D:												
Goodman-------------	0-4	2-8	1.45-1.60	0.6-2	0.18-0.24	0.0-2.9	0.5-1.0	.37	.37	5	5	56
	4-30	2-8	1.45-1.60	0.6-2	0.17-0.22	0.0-2.9	1.0-2.0	.37	.37			
	30-71	5-10	1.50-1.70	0.6-2	0.05-0.18	0.0-2.9	0.0-0.5	.20	.24			
	71-80	2-10	1.50-1.75	2-6	0.05-0.16	0.0-2.9	0.0-0.5	.24	.28			
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	.28			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
107F:												
Goodman-------------	0-4	2-8	1.45-1.60	0.6-2	0.18-0.24	0.0-2.9	0.5-1.0	.37	.37	5	5	56
	4-30	2-8	1.45-1.60	0.6-2	0.17-0.22	0.0-2.9	1.0-2.0	.37	.37			
	30-71	5-10	1.50-1.70	0.6-2	0.05-0.18	0.0-2.9	0.0-0.5	.20	.24			
	71-80	2-10	1.50-1.75	2-6	0.05-0.16	0.0-2.9	0.0-0.5	.24	.28			
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	.28			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
108B:												
Goodman-------------	0-4	2-8	1.45-1.60	0.6-2	0.18-0.24	0.0-2.9	0.5-1.0	.37	.37	5	5	56
	4-30	2-8	1.45-1.60	0.6-2	0.17-0.22	0.0-2.9	1.0-2.0	.37	.37			
	30-71	5-10	1.50-1.70	0.6-2	0.05-0.18	0.0-2.9	0.0-0.5	.20	.24			
	71-80	2-10	1.50-1.75	2-6	0.05-0.16	0.0-2.9	0.0-0.5	.24	.28			
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	.28			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
Wabeno--------------	0-3	2-8	1.20-1.50	0.6-2	0.14-0.23	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	3-23	2-8	1.30-1.45	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.43	.43			
	23-29	2-8	1.65-1.80	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.43	.43			
	29-57	6-16	1.80-1.95	0.0-0.06	0.01-0.03	0.0-2.9	0.0-0.5	.17	.24			
	57-80	3-10	1.65-1.80	0.6-2	0.01-0.03	0.0-2.9	0.0-0.5	.20	.28			
108D:												
Goodman-------------	0-4	2-8	1.45-1.60	0.6-2	0.18-0.24	0.0-2.9	0.5-1.0	.37	.37	5	5	56
	4-30	2-8	1.45-1.60	0.6-2	0.17-0.22	0.0-2.9	1.0-2.0	.37	.37			
	30-71	5-10	1.50-1.70	0.6-2	0.05-0.18	0.0-2.9	0.0-0.5	.20	.24			
	71-80	2-10	1.50-1.75	2-6	0.05-0.16	0.0-2.9	0.0-0.5	.24	.28			
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	.28			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
Wabeno--------------	0-3	2-8	1.20-1.50	0.6-2	0.14-0.23	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	3-23	2-8	1.30-1.45	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.43	.43			
	23-29	2-8	1.65-1.80	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.43	.43			
	29-57	6-16	1.80-1.95	0.0-0.06	0.01-0.03	0.0-2.9	0.0-0.5	.17	.24			
	57-80	3-10	1.65-1.80	0.6-2	0.01-0.03	0.0-2.9	0.0-0.5	.20	.28			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
109B:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Keweenaw------------	0-4	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	4-12	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	12-23	0-5	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
	23-80	2-10	---	---	---	---	---	---	---			
109D:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Keweenaw------------	0-4	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	4-12	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	12-23	0-5	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
	23-80	2-10	---	---	---	---	---	---	---			
109F:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Keweenaw------------	0-4	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	4-12	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	12-23	0-5	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
	23-80	2-10	---	---	---	---	---	---	---			
110B:												
Nadeau--------------	0-7	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-17	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.20	.24			
	17-23	8-18	1.35-1.60	0.6-2	0.04-0.09	0.0-2.9	0.0-0.5	.10	.24			
	23-80	0-2	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			
Mancelona-----------	0-3	2-8	1.35-1.65	2-6	0.09-0.14	0.0-2.9	0.5-3.0	.24	.24	3	3	86
	3-33	0-5	1.30-1.65	2-6	0.06-0.12	0.0-2.9	0.0-0.5	.17	.24			
	33-37	5-15	1.30-1.65	2-6	0.06-0.16	0.0-2.9	0.0-0.5	.17	.24			
	37-80	0-3	1.45-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
110D:												
Nadeau--------------	0-7	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-17	5-15	1.30-1.60	0.6-2	0.12-0.22	0.0-2.9	0.0-0.5	.20	.24			
	17-23	8-18	1.35-1.60	0.6-2	0.04-0.09	0.0-2.9	0.0-0.5	.10	.24			
	23-80	0-2	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			
Mancelona-----------	0-3	2-8	1.35-1.65	2-6	0.09-0.14	0.0-2.9	0.5-3.0	.24	.24	3	3	86
	3-33	0-5	1.30-1.65	2-6	0.06-0.12	0.0-2.9	0.0-0.5	.17	.24			
	33-37	5-15	1.30-1.65	2-6	0.06-0.16	0.0-2.9	0.0-0.5	.17	.24			
	37-80	0-3	1.45-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
111B:												
Grayling------------	0-3	0-5	1.30-1.65	6-20	0.07-0.09	0.0-2.9	1.0-6.0	.15	.15	5	1	220
	3-23	0-5	1.30-1.65	6-20	0.06-0.08	0.0-2.9	0.3-0.5	.15	.15			
	23-80	0-5	1.45-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
112D:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	3	5	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Michigamme----------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-4.0	.17	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.07-0.22	0.0-2.9	0.6-1.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
112F:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	3	5	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Michigamme----------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-4.0	.17	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.07-0.22	0.0-2.9	0.6-1.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
113B:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-8	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			
113D:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-8	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			
113F:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-8	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			
114B:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-8	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			
114D:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-10	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			
114F:												
Vanriper------------	0-3	2-8	1.30-1.55	0.6-2	0.11-0.16	0.0-2.9	1.0-3.0	.28	---	5	8	0
	3-20	2-8	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.6-1.0	.32	---			
	20-80	2-8	1.45-1.80	0.6-2	0.07-0.12	0.0-2.9	0.0-0.5	.20	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
117B:												
Fence---------------	0-3	2-8	1.35-1.55	0.6-2	0.20-0.24	0.0-2.9	1.0-2.0	.37	.37	5	5	56
	3-7	2-8	1.35-1.55	0.6-2	0.20-0.22	0.0-2.9	0.5-1.0	.37	.37			
	7-19	2-8	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	1.0-2.0	.37	.37			
	19-42	8-18	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	0.0-0.5	.43	.43			
	42-80	5-15	1.50-1.65	0.2-0.6	0.14-0.20	0.0-2.9	0.0-0.5	.43	.43			
118A:												
Croswell------------	0-7	0-5	1.30-1.55	6-20	0.06-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-34	0-5	1.40-1.60	6-20	0.06-0.10	0.0-2.9	0.6-1.0	.10	.15			
	34-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
Deford--------------	0-6	---	0.30-0.50	0.2-6	0.35-0.45	---	40-60	---	---	5	2	134
	6-80	0-5	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			
119B:												
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-10	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
119D:												
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
121B:												
Onota---------------	0-2	2-10	1.30-1.65	0.6-2	0.07-0.11	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	2-7	2-10	1.30-1.65	0.6-2	0.11-0.14	0.0-2.9	---	.24	.24			
	7-22	2-10	1.35-1.70	0.6-2	0.07-0.13	0.0-2.9	---	.24	.24			
	22-32	---	---	0.2-2	---	---	---	---	---			
122:												
Pleine--------------	0-9	---	0.30-0.40	0.2-6	0.35-0.45	---	40-70	---	---	5	8	0
	9-20	5-10	1.10-1.35	0.6-2	0.16-0.22	0.0-2.9	0.0-5.0	.24	.28			
	20-33	5-15	1.50-1.85	0.6-2	0.15-0.19	0.0-2.9	0.0-0.5	.24	.28			
	33-80	5-10	1.55-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.24	.28			
123A:												
Tula----------------	0-8	2-8	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.28	.37	4	3	86
	8-20	2-8	1.35-1.60	0.6-2	0.17-0.22	0.0-2.9	0.6-1.0	.20	.28			
	20-28	2-8	1.40-1.60	0.6-2	0.15-0.19	0.0-2.9	0.0-0.5	.20	.32			
	28-62	5-15	1.75-2.10	0.01-0.06	0.04-0.06	0.0-2.9	0.0-0.5	.20	.32			
	62-80	5-10	1.55-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.20	.32			
124B:												
Gogebic-------------	0-5	2-8	1.25-1.65	0.6-2	0.08-0.15	0.0-2.9	1.0-3.0	.17	.24	3	3	86
	5-18	2-8	1.25-1.65	0.6-2	0.08-0.14	0.0-2.9	0.5-1.0	.17	.24			
	18-62	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
	62-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
124B:												
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
124D:												
Gogebic-------------	0-5	2-8	1.25-1.65	0.6-2	0.08-0.15	0.0-2.9	1.0-3.0	.17	.24	3	3	86
	5-18	2-8	1.25-1.65	0.6-2	0.08-0.14	0.0-2.9	0.5-1.0	.17	.24			
	18-62	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
	62-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
125D:												
Keweenaw------------	0-4	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	4-12	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	12-23	2-10	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
	23-80	2-10	---	---	---	---	---	---	---			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.10	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
125F:												
Keweenaw------------	0-4	0-5	1.35-1.60	2-6	0.09-0.12	0.0-2.9	1.0-2.0	.15	.17	5	2	134
	4-12	0-5	1.45-1.80	2-6	0.08-0.11	0.0-2.9	0.6-1.0	.15	.17			
	12-23	0-5	1.50-1.80	2-6	0.06-0.14	0.0-2.9	0.0-0.5	.20	.24			
	23-80	2-10	---	---	---	---	---	---	---			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.10	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
126B:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
126D:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
126E:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
127B:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
127D:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
127F:												
Sundog--------------	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	---	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
128B:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
128D:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
128E:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
129C:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
130A:												
Chabeneau-----------	0-5	2-8	1.35-1.55	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	5-22	2-8	1.35-1.55	0.6-2	0.15-0.22	0.0-2.9	0.0-0.0	.32	.24			
	22-80	0-2	1.50-1.60	20-20	0.02-0.04	0.0-2.9	0.0-0.0	.10	.10			
131:												
Witbeck-------------	0-8	---	0.15-0.40	0.2-6	0.35-0.45	0.0-2.9	40-70	---	---	5	2	134
	8-15	3-10	1.25-1.60	0.6-2	0.08-0.16	0.0-2.9	0.0-1.0	.24	---			
	15-22	3-10	1.55-1.75	0.6-2	0.04-0.18	0.0-2.9	0.0-0.5	.24	.32			
	22-80	3-10	1.55-1.75	0.6-2	0.04-0.17	0.0-2.9	0.0-0.5	.24	.32			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
131:												
Cathro--------------	0-18	0-0	0.28-0.45	0.2-6	0.35-0.45	---	60-85	---	---	2	2	134
	18-31	0-0	0.15-0.30	0.2-6	0.35-0.45	---	60-85	.24	.32			
	31-80	5-10	1.50-1.70	0.2-2	0.11-0.22	0.0-2.9	0.0-0.5	.32	---			
132.												
Slickens												
133B:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	3	86
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
133D:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	3	86
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
134B:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
134D:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
134F:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
135A:												
Witbeck-------------	0-8	---	0.15-0.40	0.2-6	0.35-0.45	0.0-2.9	40-70	---	---	5	8	0
	8-15	3-10	1.25-1.60	0.6-2	0.08-0.16	0.0-2.9	0.0-1.0	.24	---			
	15-22	3-10	1.55-1.75	0.6-2	0.04-0.18	0.0-2.9	0.0-0.5	.24	.32			
	22-80	3-10	1.55-1.75	0.6-2	0.04-0.17	0.0-2.9	0.0-0.5	.24	.32			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
135A:												
Net	0-5	2-8	1.30-1.60	0.6-2	0.08-0.12	0.0-2.9	2.0-6.0	.15	.28	4	8	0
	5-18	2-8	1.40-1.65	0.6-2	0.09-0.21	0.0-2.9	0.6-1.0	.28	.37			
	18-45	1-10	1.80-2.05	0.0-0.06	0.01-0.02	0.0-2.9	0.0-0.5	.20	.28			
	45-80	1-10	1.30-1.70	0.6-2	0.01-0.02	0.0-2.9	0.0-0.5	.20	.28			
136A:												
Minocqua	0-5	0-0	0.15-0.45	2-6	0.35-0.45	0.0-2.9	30-60	.10	.10	4	2	134
	5-23	3-12	1.50-1.60	0.6-2	0.11-0.19	0.0-2.9	0.5-2.0	.43	.43			
	23-80	0-3	1.75-1.85	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
Channing	0-9	2-8	1.10-1.65	0.6-2	0.12-0.18	0.0-2.9	1.0-3.0	.24	.24	4	3	86
	9-22	2-8	1.25-1.70	0.6-2	0.11-0.16	0.0-2.9	---	.24	.24			
	22-80	0-3	1.50-1.65	20-20	0.02-0.04	0.0-2.9	---	.10	.15			
137D:												
Keewaydin	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	3	5	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
137F:												
Keewaydin	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	3	5	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
138D:												
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
Rock outcrop	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
138F:												
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
Rock outcrop	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
139B:												
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			
139D:												
Sundog	0-2	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	---	4	5	56
	2-22	2-8	1.35-1.70	0.6-2	0.14-0.22	0.0-2.9	0.6-1.0	.28	---			
	22-80	0-2	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.10	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
140B:												
Champion------------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-3.0	.17	.37	4	3	86
	5-26	2-8	1.25-1.65	0.6-2	0.10-0.20	0.0-2.9	0.6-1.0	.24	.43			
	26-43	1-10	1.80-2.05	0.0-0.06	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
	43-80	1-10	1.30-1.65	2-6	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
140D:												
Champion------------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-3.0	.17	.37	4	3	86
	5-26	2-8	1.25-1.65	0.6-2	0.10-0.20	0.0-2.9	0.6-1.0	.24	.43			
	26-43	1-10	1.80-2.05	0.0-0.06	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
	43-80	1-10	1.30-1.65	2-6	0.01-0.04	0.0-2.9	0.0-0.5	.15	.20			
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
141D:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
142B:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
142D:												
Pelissier-----------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	0.5-1.0	.15	.24	3	3	86
	6-10	2-8	1.30-1.65	2-6	0.08-0.12	0.0-2.9	0.6-1.0	.15	.24			
	10-21	0-3	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.5	.05	.15			
	21-80	0-3	1.55-1.65	20-20	0.02-0.04	0.0-2.9	0.0-0.5	.05	.15			
144B:												
Farquar-------------	0-6	2-8	1.30-1.60	2-6	0.10-0.12	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	6-9	2-8	1.30-1.70	2-6	0.06-0.10	0.0-2.9	0.0-0.0	.10	.17			
	9-20	0-5	1.30-1.70	20-20	0.03-0.05	0.0-2.9	0.0-0.0	.10	.15			
	20-36	0-3	1.30-1.70	20-20	0.02-0.04	0.0-2.9	0.0-0.0	.10	.15			
	36-80	0-3	1.50-1.70	20-20	0.02-0.04	0.0-2.9	0.0-0.0	.10	.15			
145C:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.17	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
146B:												
Munising------------	0-6	2-8	1.30-1.65	0.6-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			
Skanee--------------	0-7	2-10	1.30-1.60	0.6-2	0.09-0.18	0.0-2.9	2.0-3.0	.24	.24	3	3	86
	7-12	2-10	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.6-1.0	.24	.24			
	12-30	10-14	1.75-2.10	0.0-0.06	0.04-0.06	0.0-2.9	0.0-0.5	.24	.24			
	30-80	4-12	1.40-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
147A:												
Skanee--------------	0-7	2-10	1.30-1.60	0.6-2	0.09-0.18	0.0-2.9	2.0-3.0	.24	.24	3	3	86
	7-12	2-10	1.40-1.70	0.6-2	0.11-0.17	0.0-2.9	0.6-1.0	.24	.24			
	12-30	10-14	1.75-2.10	0.0-0.06	0.04-0.06	0.0-2.9	0.0-0.5	.24	.24			
	30-80	4-12	1.40-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
Gay-----------------	0-2	---	0.30-0.40	0.6-2	0.35-0.45	0.0-2.9	40-70	---	---	5	2	134
	2-18	5-12	1.15-1.60	0.6-2	0.07-0.14	0.0-2.9	0.0-0.5	.24	.24			
	18-31	5-15	1.30-1.80	0.6-2	0.10-0.18	0.0-2.9	0.0-0.5	.24	.24			
	31-80	4-12	1.80-1.95	0.6-2	0.09-0.17	0.0-2.9	0.0-0.5	.24	.24			
148B:												
Shoepac-------------	0-6	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-23	2-8	1.40-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
	23-53	10-18	1.60-1.85	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.24	.24			
	53-80	7-11	1.65-1.85	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.24	.24			
Ensley--------------	0-5	---	0.30-0.55	0.2-6	0.35-0.45	---	55-75	---	---	4	2	134
	5-19	5-15	1.30-1.70	0.6-2	0.11-0.18	0.0-2.9	0.0-0.5	.24	.37			
	19-80	7-11	1.70-1.80	0.6-2	0.10-0.14	0.0-2.9	0.0-0.5	.20	.28			
149:												
Evart---------------	0-10	2-8	1.35-1.50	0.6-2	0.19-0.22	0.0-2.9	1.0-6.0	.28	.28	3	5	56
	10-80	0-5	1.40-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.0	.15	.20			
Cathro--------------	0-18	0-0	0.28-0.45	0.2-6	0.35-0.45	---	60-85	---	---	2	2	134
	18-31	0-0	0.15-0.30	0.2-6	0.35-0.45	---	60-85	.24	.32			
	31-80	5-10	1.50-1.70	0.2-2	0.11-0.22	0.0-2.9	0.0-0.5	.32	---			
150:												
Shag----------------	0-2	---	0.20-0.30	0.06-0.2	0.35-0.45	0.0-2.9	40-70	---	---	5	2	134
	2-11	2-8	1.10-1.60	0.06-0.2	0.20-0.24	0.0-2.9	0.0-5.0	.37	.37			
	11-25	5-15	1.48-1.80	0.06-0.2	0.17-0.22	0.0-2.9	0.0-1.0	.43	.43			
	25-80	5-15	1.46-1.80	0.06-0.2	0.14-0.20	0.0-2.9	0.0-0.5	.43	.43			
151A:												
Spear---------------	0-2	2-8	1.20-1.50	0.06-0.2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	5	3	86
	2-6	2-8	1.20-1.50	0.06-0.2	0.20-0.24	0.0-2.9	0.5-1.0	.37	.37			
	6-31	5-15	1.35-1.60	0.06-0.2	0.20-0.24	0.0-2.9	0.0-0.5	.43	.43			
	31-80	5-15	1.50-1.80	0.06-0.2	0.10-0.24	0.0-2.9	0.0-0.5	.43	.43			
153D:												
Ishpeming-----------	0-6	0-5	1.30-1.55	6-20	0.06-0.08	0.0-2.9	1.0-2.0	.10	.15	4	1	220
	6-24	0-5	1.30-1.65	6-20	0.09-0.11	0.0-2.9	0.0-0.0	.17	.17			
	24-38	0-5	1.30-1.70	6-20	0.08-0.10	0.0-2.9	0.0-0.0	.17	.17			
	38-60	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
153F:												
Ishpeming-----------	0-6	0-5	1.30-1.55	6-20	0.06-0.08	0.0-2.9	1.0-2.0	.10	.15	4	1	220
	6-24	0-8	1.30-1.65	6-20	0.09-0.11	0.0-2.9	0.0-0.0	.17	.17			
	24-38	0-8	1.30-1.70	6-20	0.08-0.10	0.0-2.9	0.0-0.0	.17	.17			
	38-60	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
154B:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
154D:												
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Sayner--------------	0-2	0-5	1.25-1.45	6-20	0.08-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	2-14	0-5	1.35-1.65	6-20	0.03-0.11	0.0-2.9	1.0-2.0	.17	.17			
	14-27	0-4	1.45-1.70	6-20	0.03-0.11	0.0-2.9	0.0-0.5	.10	.15			
	27-80	0-3	1.55-1.80	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
155A:												
Zeba----------------	0-14	2-8	1.30-1.70	0.6-2	0.07-0.18	0.0-2.9	2.0-4.0	.17	.17	2	3	86
	14-31	5-15	1.40-1.80	0.6-2	0.07-0.18	0.0-2.9	0.0-0.5	.17	.17			
	31-41	---	---	0.2-2	---	---	---	---	---			
Jacobsville---------	0-4	0-0	0.30-0.40	0.6-6	0.35-0.45	---	40-60	---	---	2	2	134
	4-9	2-8	1.30-1.60	0.6-2	0.09-0.15	0.0-2.9	0.0-1.0	.24	.24			
	9-16	5-15	1.30-1.60	0.6-2	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	16-28	3-12	1.30-1.60	0.6-2	0.05-0.11	0.0-2.9	0.0-0.5	.20	.28			
	28-38	---	---	0.2-2	---	---	---	---	---			
156B:												
Duel----------------	0-2	2-5	1.25-1.50	6-20	0.10-0.12	0.0-2.9	1.0-2.0	.17	.17	2	2	134
	2-22	0-5	1.25-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.15			
	22-32	---	---	0.2-2	---	---	---	---	---			
	32-40	---	---	0.0-0.2	---	---	---	---	---			
157B:												
Reade---------------	0-7	2-8	1.30-1.60	0.6-2	0.19-0.21	0.0-2.9	1.0-3.0	.37	.37	2	3	86
	7-15	2-8	1.35-1.70	0.6-2	0.15-0.21	0.0-2.9	0.0-0.0	.43	.43			
	15-28	7-11	1.35-2.10	0.6-2	0.11-0.16	0.0-2.9	0.0-0.0	.24	.24			
	28-38	---	---	0.06-2	---	---	---	---	---			
Nahma---------------	0-11	0-0	0.30-0.40	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	11-14	8-15	1.30-1.60	0.6-2	0.12-0.20	0.0-2.9	0.0-1.0	.24	.24			
	14-24	8-15	1.40-1.70	0.6-2	0.10-0.19	0.0-2.9	0.0-0.5	.24	.24			
	24-34	---	---	0.06-0.6	---	---	---	---	---			
158C:												
Munising------------	0-6	2-8	1.30-1.65	0.06-2	0.10-0.18	0.0-2.9	1.0-3.0	.20	.24	4	3	86
	6-18	2-8	1.35-1.65	0.6-2	0.09-0.17	0.0-2.9	0.6-1.0	.20	.24			
	18-50	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
	50-80	4-12	1.55-1.75	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.28			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
158C:												
Onota---------------	0-2	2-10	1.30-1.65	0.6-2	0.07-0.11	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	2-7	2-10	1.30-1.65	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.24	.24			
	7-22	2-10	1.35-1.70	0.6-2	0.07-0.13	0.0-2.9	0.0-0.5	.24	.24			
	22-32	---	---	0.2-2	---	---	---	---	---			
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
159A:												
Jeske---------------	0-11	0-5	1.50-1.70	6-20	0.07-0.09	0.0-2.9	0.0-1.0	.15	.15	2	1	220
	11-21	0-5	1.50-1.70	6-20	0.06-0.08	0.0-2.9	0.0-0.0	.15	---			
	21-31	---	---	0.2-0.6	---	---	---	---	---			
	31-60	---	---	0.2-2	---	---	---	---	---			
160B:												
Paquin--------------	0-11	0-5	1.35-1.45	6-20	0.06-0.10	0.0-2.9	0.0-1.0	.15	.15	2	1	220
	11-12	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.0-2.0	.15	.15			
	12-14	0-5	1.75-2.00	0.6-6	0.05-0.06	0.0-2.9	0.6-2.0	.15	.15			
	14-36	0-5	1.45-1.60	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	36-80	0-5	1.50-1.70	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
Finch---------------	0-10	0-5	1.20-1.50	6-20	0.07-0.09	0.0-2.9	2.0-10	.15	.15	2	1	220
	10-20	0-5	1.30-1.55	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.15	.15			
	20-29	0-5	1.75-2.05	0.6-3	0.02-0.04	0.0-2.9	0.5-3.0	.15	.15			
	29-80	0-5	1.40-1.55	6-20	0.02-0.04	0.0-2.9	0.0-0.5	.15	.15			
161B:												
Yellowdog-----------	0-32	0-3	1.50-1.70	20-20	0.01-0.05	0.0-2.9	0.0-0.5	.05	.15	2	2	160
	32-60	---	---	0.2-2	---	---	---	---	---			
162B:												
Buckroe-------------	0-4	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-3.0	.10	.17	2	1	220
	4-15	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-0.0	.05	.15			
	15-25	---	---	0.2-2	---	---	---	---	---			
165B:												
Chocolay------------	0-8	3-8	1.30-1.60	0.6-2	0.09-0.10	0.0-2.9	1.0-3.0	.20	.28	4	3	86
	8-14	3-8	1.35-1.70	0.6-2	0.07-0.09	0.0-2.9	0.0-0.5	.20	.28			
	14-27	3-8	1.35-1.70	0.6-2	0.07-0.09	0.0-2.9	0.0-0.5	.20	.28			
	27-37	---	---	0.2-2	---	---	---	---	---			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
166:												
Skandia-------------	0-4	0-0	0.10-0.20	0.6-6	0.45-0.55	---	65-85	---	---	1	5	56
	4-26	0-0	0.13-0.23	0.6-6	0.35-0.45	---	65-85	---	---			
	26-31	---	---	0.2-0.6	---	---	---	---	---			
	31-41	---	---	0.2-2	---	---	---	---	---			
167:												
Skandia-------------	0-4	0-0	0.10-0.20	0.6-6	0.45-0.55	---	65-85	---	---	1	5	56
	4-26	0-0	0.13-0.23	0.6-6	0.35-0.45	---	65-85	---	---			
	26-31	---	---	0.2-2	---	---	---	---	---			
	31-41	---	---	0.2-2	---	---	---	---	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
167:												
Jacobsville---------	0-4	0-0	0.30-0.40	0.6-6	0.35-0.45	---	40-60	---	---	2	2	134
	4-9	2-8	1.30-1.60	0.6-2	0.09-0.15	0.0-2.9	0.0-1.0	.24	.24			
	9-16	5-15	1.30-1.60	0.6-2	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	16-28	3-12	1.30-1.60	0.6-2	0.05-0.11	0.0-2.9	0.0-0.5	.20	.28			
	28-38	---	---	0.2-2	---	---	---	---	---			
168B:												
Yellowdog-----------	0-32	0-3	1.50-1.70	20-20	0.01-0.05	0.0-2.9	0.0-0.5	.05	.15	2	2	160
	32-60	---	---	0.2-2	---	---	---	---	---			
Burt----------------	0-7	0-0	1.30-1.60	6-20	0.09-0.12	0.0-2.9	10-20	.15	.15	4	2	134
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.0-0.5	.15	.15			
	18-28	---	---	0.2-2	---	---	---	---	---			
170B:												
Chocolay------------	0-8	3-8	1.30-1.60	0.6-2	0.09-0.10	0.0-2.9	1.0-3.0	.20	.28	4	3	86
	8-14	3-8	1.35-1.70	0.6-2	0.07-0.09	0.0-2.9	0.0-0.5	.20	.28			
	14-27	3-8	1.35-1.70	0.6-2	0.07-0.09	0.0-2.9	0.0-0.5	.20	.28			
	27-37	---	---	0.2-2	---	---	---	---	---			
171B:												
Paavola-------------	0-8	0-5	1.35-1.65	6-20	0.05-0.08	0.0-2.9	1.0-3.0	.10	.17	4	2	134
	8-33	0-5	1.30-1.70	6-20	0.01-0.04	0.0-2.9	0.6-1.0	.10	.17			
	33-80	5-12	1.80-2.10	0.0-0.06	0.01-0.04	0.0-2.9	0.0-0.5	.17	.24			
172D:												
Buckroe-------------	0-4	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-3.0	.10	.17	2	1	220
	4-15	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-0.0	.05	.15			
	15-25	---	---	0.2-2	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
172F:												
Buckroe-------------	0-4	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-3.0	.10	.17	2	1	220
	4-15	0-3	1.35-1.45	20-20	0.01-0.05	0.0-2.9	0.0-0.0	.05	.15			
	15-25	---	---	0.2-2	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
173B:												
Pence---------------	0-6	2-8	1.20-1.65	2-6	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-13	2-8	1.35-1.45	2-6	0.10-0.15	0.0-2.9	1.0-2.0	.17	.24			
	13-31	0-5	1.65-1.75	6-60	0.05-0.08	0.0-2.9	0.0-0.5	.05	.10			
	31-80	0-4	1.35-1.80	6-60	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
173D:												
Pence---------------	0-6	2-8	1.20-1.65	2-6	0.10-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-13	2-8	1.35-1.45	2-6	0.10-0.15	0.0-2.9	1.0-2.0	.17	.24			
	13-31	0-5	1.65-1.75	6-60	0.05-0.08	0.0-2.9	0.0-0.5	.05	.10			
	31-80	0-4	1.35-1.80	6-60	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
174D:												
Yalmer--------------	0-10	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	10-30	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.6-1.0	.15	.17			
	30-80	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.20	.24			
Rubicon-------------	0-7	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-18	0-5	1.30-1.60	6-20	0.04-0.08	0.0-2.9	0.6-1.0	.10	.15			
	18-80	0-5	1.40-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.10	.15			
Urban land.												

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
175E:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
175F:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Waiska--------------	0-4	0-5	1.35-1.45	20-20	0.08-0.12	0.0-2.9	0.5-2.0	.17	.24	5	2	134
	4-36	0-5	1.30-1.60	20-20	0.04-0.08	0.0-2.9	0.6-2.0	.10	.17			
	36-80	0-3	1.45-1.60	20-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.15			
176B:												
Greenwood-----------	0-8	0-0	0.30-0.40	6-20	0.55-0.65	---	55-75	---	---	3	7	38
	8-80	0-0	0.10-0.25	0.2-6	0.45-0.55	---	65-85	---	---			
Croswell------------	0-7	0-5	1.30-1.55	6-20	0.06-0.09	0.0-2.9	0.5-2.0	.10	.15	5	1	220
	7-34	0-5	1.40-1.60	6-20	0.06-0.10	0.0-2.9	0.6-1.0	.10	.15			
	34-80	0-5	1.50-1.65	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
177E:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
177F:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
178D:												
Schweitzer----------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.16	0.0-2.9	1.0-3.0	.28	.37	4	8	0
	5-21	2-8	1.35-1.70	0.6-2	0.12-0.16	0.0-2.9	0.0-0.0	.32	.43			
	21-43	2-10	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	43-61	5-15	1.30-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	61-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.10	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
178F:												
Schweitzer----------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.16	0.0-2.9	1.0-3.0	.28	.37	4	8	0
	5-21	2-8	1.35-1.70	0.6-2	0.12-0.16	0.0-2.9	0.0-0.0	.32	.43			
	21-43	2-10	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	43-61	5-15	1.30-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	61-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
178F:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.10	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---
179E:												
Schweitzer----------	0-5	2-8	1.30-1.60	0.6-2	0.14-0.16	0.0-2.9	1.0-3.0	.28	.37	4	8	0
	5-21	2-8	1.35-1.70	0.6-2	0.12-0.16	0.0-2.9	0.0-0.0	.32	.43			
	21-43	2-10	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	43-61	5-15	1.30-1.70	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
	61-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.0	.20	.28			
Michigamme----------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-4.0	.24	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.06-0.22	0.0-2.9	0.6-2.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
180E:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
180F:												
Kalkaska------------	0-6	0-5	1.25-1.45	6-20	0.05-0.09	0.0-2.9	1.0-4.0	.15	.15	5	1	220
	6-8	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	1.0-3.0	.15	.15			
	8-17	0-5	1.35-1.45	6-20	0.06-0.08	0.0-2.9	0.5-2.0	.15	.15			
	17-80	0-5	1.35-1.50	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
181E:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
Tokiahok------------	0-11	0-5	1.35-1.65	6-20	0.10-0.12	0.0-2.9	2.0-3.0	.15	.17	4	2	134
	11-24	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	24-49	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	49-59	5-15	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	59-80	4-12	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
181F:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
Tokiahok------------	0-11	0-5	1.35-1.65	6-20	0.10-0.12	0.0-2.9	2.0-3.0	.15	.17	4	2	134
	11-24	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	24-49	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	49-59	5-15	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	59-80	4-12	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
184C:												
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
Witbeck-------------	0-8	---	0.15-0.40	0.2-6	0.35-0.45	0.0-2.9	40-70	---	---	5	2	134
	8-15	3-10	1.25-1.60	0.6-2	0.08-0.16	0.0-2.9	0.0-1.0	.24	---			
	15-22	3-10	1.55-1.75	0.6-2	0.04-0.18	0.0-2.9	0.0-0.5	.24	.32			
	22-80	3-10	1.55-1.75	0.2-2	0.04-0.17	0.0-2.9	0.0-0.5	.24	.32			
Rock outcrop--------	0-80	---	---	---	---	---	---	---	---	-	---	
185B:												
Northland-----------	0-5	2-8	1.30-1.60	0.6-2	0.16-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	5-8	2-8	1.35-1.70	0.6-2	0.15-0.17	0.0-2.9	0.0-0.5	.20	.24			
	8-18	8-18	1.35-1.70	0.6-2	0.17-0.19	0.0-2.9	0.0-0.5	.24	.28			
	18-80	0-5	1.45-1.65	20-20	0.01-0.04	0.0-2.9	0.0-0.5	.05	.15			
187B:												
Reade---------------	0-7	2-8	1.30-1.60	0.6-2	0.19-0.21	0.0-2.9	1.0-3.0	.37	.37	4	3	86
	7-15	2-8	1.35-1.70	0.6-2	0.15-0.21	0.0-2.9	0.0-0.0	.43	.43			
	15-28	5-12	1.35-2.10	0.6-2	0.11-0.16	0.0-2.9	0.0-0.0	.24	.24			
	28-38	---	---	0.06-2	---	---	---	---	---			
190B:												
Emmet---------------	0-3	2-8	1.30-1.65	0.06-2	0.12-0.15	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	3-21	2-8	1.40-1.70	0.06-2	0.11-0.14	0.0-2.9	0.0-0.0	.24	.24			
	21-28	10-18	1.50-1.75	0.6-2	0.11-0.18	0.0-2.9	0.0-0.0	.32	.32			
	28-80	7-11	1.50-1.75	0.2-0.6	0.08-0.14	0.0-2.9	0.0-0.0	.28	.28			
Cunard--------------	0-4	5-10	1.30-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.24	.24	2	3	86
	4-19	5-18	1.35-1.70	0.6-2	0.09-0.19	0.0-2.9	---	.24	.24			
	19-27	7-11	1.60-1.70	0.6-2	0.08-0.18	0.0-2.9	---	.24	.32			
	27-37	---	---	0.06-0.6	---	---	---	---	---			
191B:												
Nahma---------------	0-11	0-0	0.30-0.40	0.2-6	0.35-0.45	---	40-60	---	---	2	2	134
	11-14	8-15	1.30-1.60	0.6-2	0.12-0.20	0.0-2.9	---	.24	.24			
	14-24	8-15	1.40-1.70	0.6-2	0.10-0.19	0.0-2.9	---	.24	.24			
	24-34	---	---	0.06-0.6	---	---	---	---	---			
Sundell-------------	0-8	2-10	1.30-1.50	0.6-2	0.15-0.22	0.0-2.9	5.0-10	.32	.32	2	5	56
	8-17	2-10	1.30-1.50	0.6-2	0.08-0.15	0.0-2.9	---	.24	.24			
	17-22	7-11	1.35-1.70	0.6-2	0.11-0.19	0.0-2.9	---	.24	.24			
	22-40	---	---	0.06-0.6	---	---	---	---	---			
193E:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
Tokiahok------------	0-11	0-5	1.35-1.55	6-20	0.07-0.09	0.0-2.9	2.0-3.0	.15	.15	4	1	220
	11-24	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	24-49	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	49-59	5-15	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	59-80	4-12	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
194E:												
Sporley-------------	0-6	2-8	1.35-1.55	0.2-0.6	0.22-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	6-16	2-8	1.35-1.70	0.2-0.6	0.17-0.22	0.0-2.9	0.5-1.0	.43	.43			
	16-45	10-18	1.35-1.70	0.2-0.6	0.17-0.22	0.0-2.9	0.0-0.5	.43	.43			
	45-80	10-18	1.45-1.75	0.2-0.6	0.12-0.22	0.0-2.9	0.0-0.5	.37	.37			
196E:												
Frohling------------	0-7	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	7-16	2-8	1.35-1.70	0.6-2	0.12-0.17	0.0-2.9	0.0-0.0	.24	.24			
	16-80	5-18	1.80-2.10	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.0	.24	.24			
Onota---------------	0-2	2-10	1.30-1.65	0.6-2	0.07-0.11	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	2-7	2-10	1.30-1.65	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.24	.24			
	7-22	2-10	1.35-1.70	0.6-6	0.07-0.13	0.0-2.9	0.0-0.5	.24	.24			
	22-32	---	---	0.2-2	---	---	---	---	---			
Tokiahok------------	0-11	0-5	1.35-1.65	6-20	0.10-0.12	0.0-2.9	2.0-3.0	.15	.17	4	2	134
	11-24	0-5	1.30-1.60	6-20	0.06-0.11	0.0-2.9	0.0-1.0	.17	.17			
	24-49	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	49-59	5-15	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
	59-80	4-12	1.40-1.65	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.24	.24			
197B:												
Shoepac-------------	0-6	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-23	2-8	1.40-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
	23-53	10-18	1.60-1.85	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.24	.24			
	53-80	7-11	1.65-1.85	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.24	.24			
Trenary-------------	0-5	2-10	1.35-1.55	0.6-2	0.18-0.22	0.0-2.9	1.0-3.0	.24	.24	5	3	86
	5-15	2-10	1.35-1.60	0.6-2	0.14-0.19	0.0-2.9	0.5-1.0	.24	.24			
	15-48	10-14	1.40-1.70	0.6-2	0.08-0.14	0.0-2.9	0.0-0.5	.24	.24			
	48-80	7-11	1.60-1.80	0.6-2	0.09-0.19	0.0-2.9	0.0-0.5	.28	.28			
198B:												
Shoepac-------------	0-6	2-8	1.30-1.65	0.6-2	0.13-0.18	0.0-2.9	1.0-3.0	.24	.24	3	3	86
	6-23	2-8	1.40-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
	23-53	10-18	1.60-1.85	0.6-2	0.11-0.14	0.0-2.9	0.0-0.5	.24	.24			
	53-80	7-11	1.65-1.85	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.24	.24			
Reade---------------	0-7	2-8	1.30-1.60	0.6-2	0.19-0.21	0.0-2.9	1.0-3.0	.37	.37	4	3	86
	7-15	2-8	1.35-1.70	0.6-2	0.15-0.21	0.0-2.9	0.0-0.0	.43	.43			
	15-28	5-12	1.35-2.10	0.6-2	0.11-0.16	0.0-2.9	0.0-0.0	.24	.24			
	28-38	---	---	0.06-2	---	---	---	---	---			
199.												
Udorthents, ash												
200A:												
Charlevoix----------	0-8	2-10	1.30-1.65	0.6-2	0.12-0.18	0.0-2.9	2.0-3.0	.24	.24	5	3	86
	8-12	2-10	1.35-1.65	0.6-2	0.08-0.20	0.0-2.9	0.0-0.5	.24	.24			
	12-28	10-25	1.40-1.70	0.6-2	0.12-0.18	0.0-2.9	0.0-0.5	.32	.32			
	28-70	7-11	1.55-1.70	0.6-2	0.06-0.12	0.0-2.9	0.0-0.5	.32	.32			
	70-80	---	---	0.06-0.6	---	---	---	---	---			
Ensley--------------	0-5	---	0.30-0.55	0.2-6	0.35-0.45	---	55-75	---	---	4	2	134
	5-19	5-15	1.30-1.70	0.6-2	0.11-0.18	0.0-2.9	0.0-0.5	.24	.37			
	19-70	7-11	1.45-1.70	0.6-2	0.10-0.14	0.0-2.9	0.0-0.5	.20	.28			
	70-80	---	---	0.06-0.6	---	---	---	---	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
201B:												
Sauxhead------------	0-4	2-8	1.30-1.60	2-6	0.12-0.14	0.0-2.9	1.0-3.0	.20	.24	2	3	86
	4-14	0-3	1.30-1.70	20-20	0.04-0.06	0.0-2.9	0.0-0.0	.05	.15			
	14-17	---	---	0.2-0.6	---	---	---	---	---			
	17-27	---	---	0.0-0.2	---	---	---	---	---			
Jacobsville---------	0-4	0-0	0.30-0.40	0.6-6	0.35-0.45	---	40-60	---	---	2	2	134
	4-9	2-8	1.30-1.60	0.6-2	0.09-0.15	0.0-2.9	0.0-1.0	.24	.24			
	9-16	5-15	1.30-1.60	0.6-2	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	16-28	3-12	1.30-1.60	0.6-2	0.05-0.11	0.0-2.9	0.0-0.5	.20	.28			
	28-38	---	---	0.2-2	---	---	---	---	---			
202B:												
Sauxhead------------	0-4	2-8	1.30-1.60	2-6	0.12-0.14	0.0-2.9	1.0-3.0	.20	.24	2	3	86
	4-14	0-3	1.30-1.70	20-20	0.04-0.06	0.0-2.9	0.0-0.0	.05	.15			
	14-17	---	---	0.2-0.6	---	---	---	---	---			
	17-27	---	---	0.0-0.2	---	---	---	---	---			
203A:												
Au Gres-------------	0-8	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	2.0-4.0	.10	.15	5	1	220
	8-27	0-5	1.50-1.70	6-20	0.06-0.09	0.0-2.9	0.6-1.0	.10	.15			
	27-80	0-5	1.50-1.70	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.10	.15			
Deford--------------	0-6	---	0.30-0.50	0.2-6	0.35-0.45	---	40-60	---	---	5	2	134
	6-80	0-5	1.40-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.5	.17	.17			
204B:												
Gogebic-------------	0-5	2-8	1.25-1.65	0.6-2	0.08-0.15	0.0-2.9	1.0-3.0	.17	.24	3	3	86
	5-18	2-8	1.25-1.65	0.6-2	0.08-0.14	0.0-2.9	0.5-1.0	.17	.24			
	18-62	5-15	1.80-2.05	0.0-0.06	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
	62-80	2-10	1.60-1.80	0.6-2	0.02-0.04	0.0-2.9	0.0-0.5	.17	.24			
Tula----------------	0-8	2-8	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	2.0-3.0	.28	.37	4	3	86
	8-20	2-8	1.35-1.60	0.6-2	0.17-0.22	0.0-2.9	0.6-1.0	.20	.28			
	20-28	5-10	1.40-1.60	0.6-2	0.15-0.19	0.0-2.9	0.0-0.5	.20	.32			
	28-62	5-15	1.75-2.10	0.01-0.06	0.04-0.06	0.0-2.9	0.0-0.5	.20	.32			
	62-80	5-10	1.55-1.70	0.6-2	0.11-0.16	0.0-2.9	0.0-0.5	.20	.32			
206B:												
Traunik-------------	0-4	2-8	1.30-1.60	0.6-2	0.12-0.14	0.0-2.9	1.0-3.0	.20	.24	3	3	86
	4-11	2-8	1.35-1.70	0.6-2	0.10-0.12	0.0-2.9	0.5-1.0	.20	.24			
	11-31	0-3	1.35-1.65	6-40	0.04-0.05	0.0-2.9	0.0-0.5	.10	.15			
	31-80	0-3	1.55-1.65	6-40	0.02-0.04	0.0-2.9	0.0-0.5	.10	.15			
207D:												
Dishno--------------	0-9	2-8	1.30-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.28	.37	4	5	56
	9-22	2-8	1.35-1.70	0.6-2	0.16-0.18	0.0-2.9	0.5-2.0	.32	.32			
	22-46	1-5	1.50-1.80	2-6	0.08-0.10	0.0-2.9	0.0-0.5	.10	.20			
	46-50	---	---	0.01-0.06	---	---	---	---	---			
Michigamme----------	0-5	2-8	1.10-1.35	0.6-2	0.10-0.17	0.0-2.9	1.0-4.0	.17	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.07-0.22	0.0-2.9	0.6-1.0	.28	.37			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.20	.28			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
Rock outcrop--------	0-80	---	---	0.01-0.06	---	---	---	---	---	-	---	---

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
208F:												
Keewaydin-----------	0-4	2-8	1.35-1.60	0.6-2	0.10-0.15	0.0-2.9	1.0-3.0	.17	.24	2	3	86
	4-10	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	10-20	2-8	1.35-1.65	0.6-2	0.10-0.22	0.0-2.9	0.0-1.0	.20	.28			
	20-31	0-5	1.35-1.70	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
	31-80	0-5	1.55-1.75	2-20	0.03-0.09	0.0-2.9	0.0-0.0	.10	.17			
Michigamme----------	0-5	2-8	1.25-1.60	0.6-2	0.11-0.18	0.0-2.9	1.0-4.0	.28	.37	2	3	86
	5-24	2-8	1.35-1.60	0.6-2	0.07-0.22	0.0-2.9	0.6-2.0	.28	.43			
	24-29	5-10	1.50-1.85	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.15	.24			
	29-39	---	---	0.01-0.06	---	---	---	---	---			
209B:												
Garlic--------------	0-9	0-5	1.30-1.55	6-20	0.07-0.09	0.0-2.9	1.0-2.0	.15	.15	5	1	250
	9-26	0-5	1.40-1.65	6-20	0.06-0.08	0.0-2.9	0.5-1.0	.15	.15			
	26-80	0-5	1.55-1.65	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.15	.15			
Fence---------------	0-3	2-8	1.35-1.55	0.6-2	0.20-0.24	0.0-2.9	1.0-2.0	.37	.37	5	5	56
	3-7	2-8	1.35-1.55	0.6-2	0.20-0.22	0.0-2.9	0.5-1.0	.37	.37			
	7-19	2-8	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	1.0-2.0	.37	.37			
	19-42	8-18	1.50-1.65	0.6-2	0.16-0.22	0.0-2.9	0.0-0.5	.43	.43			
	42-80	5-15	1.50-1.65	0.2-0.6	0.14-0.20	0.0-2.9	0.0-0.5	.43	.43			
M-W.												
Miscellaneous water												
W.												
Water												

Table 19.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
10B:					
Grayling-------------	0-3	---	2.0-14	3.5-5.5	0
	3-23	---	1.0-4.0	3.5-5.5	0
	23-80	---	1.0-2.0	3.5-6.5	0
10D:					
Grayling-------------	0-3	---	2.0-14	3.5-5.5	0
	3-23	---	1.0-4.0	3.5-5.5	0
	23-80	---	1.0-2.0	3.5-6.5	0
10E:					
Grayling-------------	0-3	---	2.0-14	3.5-5.5	0
	3-23	---	1.0-4.0	3.5-5.5	0
	23-80	---	1.0-2.0	3.5-6.5	0
11C:					
Deer Park------------	0-3	---	1.0-5.0	3.5-6.0	0
	3-11	---	1.0-3.0	3.5-6.5	0
	11-80	---	0.0-2.0	3.5-6.0	0
11D:					
Deer Park------------	0-3	---	1.0-5.0	3.5-6.0	0
	3-11	---	1.0-3.0	3.5-6.5	0
	11-80	---	0.0-2.0	3.5-6.0	0
12B:					
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
12D:					
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
12E:					
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
12F:					
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
13B:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
13D:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
13E:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
13F:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
14B:					
Rousseau-------------	0-6	---	3.0-10	4.5-6.0	0
	6-27	1.0-5.0	---	4.5-6.0	0
	27-80	1.0-2.0	---	5.1-6.5	0
14D:					
Rousseau-------------	0-6	---	3.0-10	4.5-6.0	0
	6-27	1.0-5.0	---	4.5-6.0	0
	27-80	1.0-2.0	---	5.1-6.5	0
15A:					
Croswell-------------	0-7	---	1.0-5.0	3.5-5.5	0
	7-34	---	1.0-4.0	3.5-5.5	0
	34-80	1.0-2.0	---	3.5-6.5	0
16A:					
Paquin---------------	0-11	---	3.0-5.0	3.5-5.5	---
	11-12	---	1.0-4.0	3.5-6.0	---
	12-14	1.0-2.0	---	3.0-6.0	---
	14-36	1.0-2.0	---	5.1-6.5	---
	36-80	3.0-5.0	---	5.1-6.5	---
17A:					
Au Gres--------------	0-8	---	5.0-10	3.5-5.5	0
	8-27	---	2.0-5.0	3.5-6.0	0
	27-80	1.0-2.0	---	4.5-6.0	0
18:					
Kinross--------------	0-5	---	100-140	3.6-5.0	0
	5-30	---	1.0-10	3.6-6.0	0
	30-80	1.0-2.0	---	4.5-6.5	0
19:					
Deford---------------	0-6	80-120	---	3.5-6.0	0
	6-80	1.0-5.0	---	4.5-8.4	0
20B:					
Rousseau-------------	0-6	---	3.0-10	4.5-6.0	0
	6-27	1.0-5.0	---	4.5-6.0	0
	27-80	1.0-2.0	---	5.1-6.5	0
Ocqueoc--------------	0-2	---	3.0-14	4.5-6.0	0
	2-7	---	4.0-15	4.5-6.0	0
	7-27	3.0-14	---	4.5-6.5	0
	27-80	6.0-22	---	5.6-7.8	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
20D:					
Rousseau-------------	0-6	---	3.0-10	4.5-6.0	0
	6-27	1.0-5.0	---	4.5-6.0	0
	27-80	1.0-2.0	---	5.1-6.5	0
Ocqueoc--------------	0-2	---	3.0-14	4.5-6.0	0
	2-7	---	4.0-15	4.5-6.0	0
	7-27	3.0-14	---	4.5-6.5	0
	27-80	6.0-22	---	5.6-7.8	0
20E:					
Rousseau-------------	0-6	---	3.0-10	4.5-6.0	0
	6-27	1.0-5.0	---	4.5-6.0	0
	27-80	1.0-2.0	---	5.1-6.5	0
Ocqueoc--------------	0-2	---	3.0-14	4.5-6.0	0
	2-7	---	4.0-15	4.5-6.0	0
	7-27	3.0-14	---	4.5-6.5	0
	27-80	6.0-22	---	5.6-7.8	0
22B:					
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0
24B:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
24D:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
25B:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
25D:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
26A:					
Skanee	0-7	---	5.0-20	3.5-6.0	0
	7-12	---	5.0-15	3.5-6.0	0
	12-30	---	5.0-10	3.5-6.0	0
	30-80	---	1.0-4.0	4.5-6.0	0
27:					
Gay	0-2	50-90	---	5.1-6.0	0
	2-18	12-20	---	5.1-6.0	0
	18-31	1.0-8.0	---	5.1-6.0	0
	31-80	1.0-3.0	---	5.1-7.3	0
28B:					
Keweenaw	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
28D:					
Keweenaw	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
28E:					
Keweenaw	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
29B:					
Yalmer	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
29D:					
Yalmer	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
31D:					
Trenary	0-5	3.0-15	---	4.1-6.0	0
	5-15	1.0-5.0	---	4.1-6.0	0
	15-48	1.0-5.0	---	5.1-7.3	0
	48-80	1.0-10	---	6.6-8.4	1-25
32A:					
Charlevoix	0-8	10-30	---	4.1-6.0	0
	8-12	5.0-10	---	4.1-6.0	0
	12-28	5.0-10	---	5.6-7.3	0-5
	28-80	2.0-10	---	7.4-8.4	10-30
33:					
Ensley	0-5	150-200	---	6.1-7.3	0
	5-19	4.0-8.0	---	6.1-7.3	0
	19-80	1.0-4.0	---	7.4-8.4	10-20
34B:					
Onaway	0-6	5.0-15	---	5.1-6.0	0
	6-13	3.0-10	---	5.1-7.3	0
	13-18	5.0-20	---	6.6-7.8	1-10
	18-80	5.0-25	---	7.4-8.4	10-30

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
34D:					
Onaway---------------	0-6	5.0-15	---	5.1-6.0	0
	6-13	3.0-10	---	5.1-7.3	0
	13-18	5.0-20	---	6.6-7.8	1-10
	18-80	5.0-25	---	7.4-8.4	10-30
34E:					
Onaway---------------	0-6	5.0-15	---	5.1-6.0	0
	6-13	3.0-10	---	5.1-7.3	0
	13-18	5.0-20	---	6.5-7.8	1-10
	18-80	5.0-25	---	7.4-8.4	10-30
35B:					
Champion-------------	0-5	---	5.0-15	3.5-6.0	0
	5-26	---	2.0-10	3.5-6.0	0
	26-43	---	1.0-2.0	3.5-6.0	0
	43-80	---	0.0-1.0	3.5-6.0	0
35D:					
Champion-------------	0-5	---	5.0-15	3.5-6.0	0
	5-26	---	2.0-10	3.5-6.0	0
	26-43	---	1.0-2.0	3.5-6.0	0
	43-80	---	0.0-1.0	3.5-6.0	0
36A:					
Net------------------	0-5	---	6.0-25	3.5-6.0	0
	5-18	---	6.0-12	3.5-6.0	0
	18-45	---	1.0-6.0	3.5-6.0	0
	45-80	1.0-3.0	---	5.1-6.5	0
37:					
Witbeck--------------	0-8	---	50-90	4.5-6.0	0
	8-15	---	30-40	4.5-6.0	0
	15-22	---	1.0-8.0	4.5-6.0	0
	22-80	1.0-3.0	---	5.1-6.5	0
38B:					
Pence----------------	0-6	3.0-15	---	4.5-6.0	0
	6-13	---	2.0-15	4.5-6.0	0
	13-31	0.0-10	---	4.5-6.5	0
	31-80	0.0-4.0	---	5.1-6.5	0
38D:					
Pence----------------	0-6	3.0-15	---	4.5-6.0	0
	6-13	---	2.0-15	4.5-6.0	0
	13-31	0.0-10	---	4.5-6.5	0
	31-80	0.0-4.0	---	5.1-6.5	0
38E:					
Pence----------------	0-6	3.0-15	---	4.5-6.0	0
	6-13	---	2.0-15	4.5-6.0	0
	13-31	0.0-10	---	4.5-6.5	0
	31-80	0.0-4.0	---	5.1-6.5	0
39B:					
Amasa----------------	0-5	---	5.0-20	3.6-6.0	0
	5-16	---	1.0-10	3.6-6.0	0
	16-80	---	1.0-2.0	3.6-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
39D:					
Amasa----------------	0-5	---	5.0-20	3.6-6.0	0
	5-16	---	1.0-10	3.6-6.0	0
	16-80	---	1.0-2.0	3.6-6.5	0
39E:					
Amasa----------------	0-5	---	5.0-20	3.6-6.0	0
	5-16	---	1.0-10	3.6-6.0	0
	16-80	---	1.0-2.0	3.6-6.5	0
40B:					
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
40D:					
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
41A:					
Channing-------------	0-9	---	6.0-10	4.5-6.0	0
	9-22	---	2.0-14	4.5-6.0	0
	22-80	1.0-2.0	---	5.1-6.5	0
42:					
Minocqua-------------	0-5	120-190	---	4.5-6.0	0
	5-23	2.0-20	---	4.5-6.5	0
	23-80	0.0-3.0	---	5.1-7.8	0
43B:					
Karlin---------------	0-4	---	3.0-15	3.6-5.5	0
	4-15	---	2.0-10	3.6-5.5	0
	15-29	1.0-10	---	4.5-6.0	0
	29-80	1.0-4.0	---	5.6-6.5	0
43D:					
Karlin---------------	0-4	---	3.0-15	3.6-5.5	0
	4-15	---	2.0-10	3.6-5.5	0
	15-29	1.0-10	---	4.5-6.0	0
	29-80	1.0-4.0	---	5.6-6.5	0
44B:					
Carlshend------------	0-3	---	3.0-30	3.5-6.0	0
	3-14	---	2.0-15	4.5-6.0	0
	14-25	---	0.0-0.0	---	0
	25-35	---	0.0-0.0	---	0
45A:					
Zeba-----------------	0-14	---	5.0-15	4.5-6.0	0
	14-31	---	1.0-10	4.5-6.0	0
	31-41	---	---	---	---
46:					
Jacobsville----------	0-4	80-120	---	4.5-6.0	0
	4-9	1.0-10	---	4.5-6.0	0
	9-16	1.0-5.0	---	5.1-6.5	0
	16-28	1.0-5.0	---	5.1-6.5	0
	28-38	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
48:					
Burt-----------------	0-7	---	20-45	4.5-6.0	0
	7-18	---	1.0-3.0	4.5-6.0	0
	18-28	---	---	---	---
50A:					
Sundell--------------	0-8	10-25	---	6.1-7.3	0
	8-17	1.0-10	---	6.1-7.8	0
	17-22	1.0-10	---	6.1-8.4	0-20
	22-40	---	---	---	---
51:					
Nahma----------------	0-11	80-120	---	6.1-7.3	0
	11-14	2.0-10	---	6.1-7.3	0
	14-24	2.0-10	---	6.6-8.4	5-30
	24-34	---	---	---	---
52B:					
Summerville----------	0-5	5.0-15	---	5.6-7.3	0
	5-13	2.0-15	---	6.1-8.4	0-30
	13-23	---	---	---	---
55F:					
Michigamme-----------	0-5	---	5.0-15	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
56D:					
Peshekee-------------	0-5	---	4.0-15	4.5-6.0	0
	5-14	---	2.0-5.0	4.5-6.0	0
	14-24	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
56E:					
Peshekee-------------	0-5	---	4.0-15	4.5-6.0	0
	5-14	---	2.0-5.0	4.5-6.0	0
	14-24	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
56F:					
Peshekee-------------	0-5	---	4.0-15	4.5-6.0	0
	5-14	---	2.0-5.0	4.5-6.0	0
	14-24	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
57:					
Carbondale-----------	0-6	150-230	---	5.1-6.5	0
	6-38	150-230	---	5.1-6.5	0
	38-80	150-200	---	5.6-7.8	0
Tawas----------------	0-6	80-120	---	4.5-6.5	0
	6-25	80-120	---	4.5-7.3	0
	25-80	1.0-3.0	---	5.6-8.4	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
58:					
Greenwood------------	0-8	---	80-120	3.6-4.4	0
	8-80	---	150-200	3.6-4.4	0
Dawson---------------	0-6	---	80-120	3.6-4.4	0
	6-34	---	150-230	3.6-4.4	0
	34-36	---	10-25	3.6-4.4	0
	36-80	1.0-2.0	---	4.5-6.5	0
59:					
Chippeny-------------	0-29	110-150	---	6.1-7.3	0
	29-38	1.0-18	---	6.6-8.4	1-20
	38-48	---	---	---	---
Nahma----------------	0-11	80-120	---	6.1-7.3	0
	11-14	2.0-10	---	6.1-7.3	0
	14-24	2.0-10	---	6.6-8.4	5-30
	24-34	---	---	---	---
60:					
Histosols------------	0-51	---	---	---	---
	51-80	---	---	---	---
Aquents--------------	0-80	---	---	---	---
61.					
Pits, borrow					
62B:					
Udorthents-----------	0-60	---	---	---	---
	60-80	---	---	---	---
Udipsamments---------	0-80	---	---	5.1-6.5	---
64.					
Pits and Dumps					
65B:					
Udorthents-----------	0-60	---	---	---	---
	60-80	---	---	---	---
Urban land.					
66B:					
Udipsamments---------	0-80	---	---	5.1-6.5	---
Urban land.					
67B:					
Urban land.					
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
68:					
Pits, quarries-------	0-80	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
69B:					
Escanaba	0-6	3.0-15	---	5.1-6.0	0
	6-26	1.0-10	---	5.1-6.0	0
	26-35	2.0-10	---	5.5-7.3	0
	35-42	2.0-10	---	6.6-7.8	0
	42-80	2.0-10	---	6.6-7.8	0-20
69D:					
Escanaba	0-6	3.0-15	---	5.1-6.0	0
	6-26	1.0-10	---	5.1-6.0	0
	26-35	2.0-10	---	5.5-7.3	0
	35-42	2.0-10	---	6.6-7.8	0
	42-80	2.0-10	---	6.6-7.8	0-20
70B:					
Nadeau	0-7	5.0-15	---	5.6-7.3	0
	7-17	2.0-10	---	5.6-7.3	0
	17-23	3.0-10	---	5.6-7.8	0
	23-80	1.0-2.0	---	7.9-8.4	10-25
70D:					
Nadeau	0-7	5.0-15	---	5.6-7.3	0
	7-17	2.0-10	---	5.6-7.3	0
	17-23	3.0-10	---	5.6-7.8	0
	23-80	1.0-2.0	---	7.9-8.4	10-25
71B:					
Evart	0-10	5.0-20	---	6.1-7.3	0
	10-80	1.0-3.0	---	6.1-8.4	0-10
Pelkie	0-7	4.0-10	---	4.5-6.0	0
	7-80	1.0-2.0	---	4.5-6.5	0
Sturgeon	0-6	5.0-15	---	4.5-6.0	0
	6-35	2.0-10	---	4.5-6.0	0
	35-80	1.0-5.0	---	4.5-6.5	0
72B:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
72D:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	---	---	7.4-8.4	---
72E:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
73B:					
Gogebic	0-5	---	5.0-20	4.5-6.0	0
	5-18	---	1.0-15	4.5-6.0	0
	18-62	---	1.0-15	4.5-6.0	0
	62-80	1.0-10	---	5.6-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
73D:					
Gogebic--------------	0-5	---	5.0-20	4.5-6.0	0
	5-18	---	1.0-15	4.5-6.0	0
	18-62	---	1.0-15	4.5-6.0	0
	62-80	1.0-10	---	5.6-6.5	0
74D:					
Schweitzer-----------	0-5	---	2.0-20	3.5-5.5	0
	5-21	---	2.0-20	4.5-6.0	0
	21-43	1.0-10	---	5.1-6.0	0
	43-61	1.0-10	---	5.1-6.0	0
	61-80	1.0-10	---	5.6-6.5	0
Michigamme-----------	0-5	---	3.0-30	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
74F:					
Schweitzer-----------	0-5	---	2.0-20	3.5-5.5	0
	5-21	---	2.0-20	4.5-6.0	0
	21-43	1.0-10	---	5.1-6.0	0
	43-61	1.0-10	---	5.1-6.0	0
	61-80	1.0-10	---	5.6-6.5	0
Michigamme-----------	0-5	---	3.0-30	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
76C:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0
Voelker--------------	0-11	---	4.0-15	4.5-5.5	0
	11-15	---	2.0-10	4.5-5.5	0
	15-31	2.0-10	---	5.1-6.0	0
	31-39	2.0-15	---	5.6-6.5	0
	39-80	2.0-15	---	5.6-6.5	0
76E:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
76E:					
Voelker--------------	0-11	---	4.0-15	4.5-5.5	0
	11-15	---	2.0-10	4.5-5.5	0
	15-31	2.0-10	---	5.1-6.0	0
	31-39	2.0-15	---	5.6-6.5	0
	39-80	2.0-15	---	5.6-6.5	0
76F:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0
Voelker--------------	0-11	---	4.0-15	4.5-5.5	0
	11-15	---	2.0-10	4.5-5.5	0
	15-31	2.0-10	---	5.1-6.0	0
	31-39	2.0-15	---	5.6-6.5	0
	39-80	2.0-15	---	5.6-6.5	0
77D:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0
Voelker--------------	0-11	---	4.0-15	4.5-5.5	0
	11-15	---	2.0-10	4.5-5.5	0
	15-31	2.0-10	---	5.1-6.0	0
	31-39	2.0-15	---	5.6-6.5	0
	39-80	2.0-15	---	5.6-6.5	0
77E:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Alcona---------------	0-9	3.0-15	---	4.5-6.0	0
	9-13	1.0-6.0	---	4.5-6.0	0
	13-26	1.0-8.0	---	5.1-6.5	0
	26-49	2.0-8.0	---	5.1-6.5	0
	49-80	1.0-8.0	---	5.1-7.3	0
Voelker--------------	0-11	---	4.0-15	4.5-5.5	0
	11-15	---	2.0-10	4.5-5.5	0
	15-31	2.0-10	---	5.1-6.0	0
	31-39	2.0-15	---	5.6-6.5	0
	39-80	2.0-15	---	5.6-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
78C:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
78E:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
78F:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
79B:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Munising-------------	0-6	---	3.0-10	4.5-6.0	0
	6-18	---	2.0-10	4.5-6.0	0
	18-50	---	2.0-10	4.5-6.0	0
	50-80	1.0-2.0	---	5.6-6.5	0
80B:					
Sayner---------------	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
80D:					
Sayner---------------	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
80E:					
Sayner	0-2	2.0-10	---	4.5-6.0	0
	2-14	1.0-6.0	---	4.5-6.5	0
	14-27	---	2.0-8.0	4.5-6.0	0
	27-80	0.0-3.0	---	5.1-6.5	0
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
81B:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.5-5.5	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-6.0	---
81D:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.1-5.5	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-6.0	---
81E:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.1-5.5	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-6.0	---
84D:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Ishpeming	0-6	3.0-10	---	4.5-6.0	0
	6-24	1.0-10	---	4.5-6.0	0
	24-38	1.0-5.0	---	4.5-6.0	0
	38-48	---	---	---	---
Rock outcrop	0-80	---	---	---	---
84F:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Ishpeming	0-6	3.0-10	---	4.5-6.0	0
	6-24	1.0-10	---	4.5-6.0	0
	24-38	1.0-5.0	---	4.5-6.0	0
	38-48	---	---	---	---
Rock outcrop	0-80	---	---	---	---
85A:					
Solona	0-9	3.0-25	---	6.6-7.3	0
	9-25	2.0-15	---	6.6-7.3	0
	25-80	1.0-20	---	7.4-8.4	0-35

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
86B:					
Mashek	0-3	10-20	---	5.1-6.0	0
	3-17	2.0-6.0	---	5.1-6.0	0
	17-27	2.0-6.0	---	6.1-7.3	0
	27-38	3.0-9.0	---	6.6-7.8	0
	38-43	1.0-3.0	---	7.4-8.4	0-20
	43-80	1.0-3.0	---	7.4-8.4	10-30
87B:					
Cunard	0-4	3.0-15	---	5.6-7.3	0
	4-19	1.0-10	---	5.6-7.8	0
	19-27	1.0-10	---	7.4-8.4	5-30
	27-37	---	---	---	---
88:					
Cathro	0-18	150-230	---	4.5-7.3	0
	18-31	150-230	---	4.5-7.3	0
	31-80	2.0-20	---	5.6-8.4	5-25
Ensley	0-5	150-200	---	6.1-7.3	0
	5-19	4.0-8.0	---	6.1-7.3	0
	19-80	1.0-4.0	---	7.4-8.4	10-20
89B:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
Solona	0-9	3.0-25	---	6.6-7.3	0
	9-25	2.0-15	---	6.6-7.3	0
	25-80	1.0-20	---	7.4-8.4	0-35
90B:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
Escanaba	0-6	3.0-15	---	5.1-6.0	0
	6-26	1.0-10	---	5.1-6.0	0
	26-35	2.0-10	---	5.5-7.3	0
	35-42	2.0-10	---	6.6-7.8	0
	42-80	2.0-10	---	6.6-7.8	0-20
90D:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
Escanaba	0-6	3.0-15	---	5.1-6.0	0
	6-26	1.0-10	---	5.1-6.0	0
	26-35	2.0-10	---	5.5-7.3	0
	35-42	2.0-10	---	6.6-7.8	0
	42-80	2.0-10	---	6.6-7.8	0-20

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
91B:					
Onaway---------------	0-6	5.0-15	---	5.1-6.0	0
	6-13	3.0-10	---	5.1-7.3	0
	13-18	5.0-20	---	6.6-7.8	1-10
	18-80	5.0-25	---	7.4-8.4	10-30
Nadeau---------------	0-7	5.0-15	---	5.6-7.3	0
	7-17	2.0-10	---	5.6-7.3	0
	17-23	3.0-10	---	5.6-7.8	0
	23-80	1.0-2.0	---	7.9-8.4	10-25
92A:					
Ensley---------------	0-5	150-200	---	6.1-7.3	0
	5-19	4.0-8.0	---	6.1-7.3	0
	19-80	1.0-4.0	---	7.4-8.4	10-20
Solona---------------	0-9	3.0-25	---	6.6-7.3	0
	9-25	2.0-15	---	6.6-7.3	0
	25-80	1.0-20	---	7.4-8.4	0-35
93:					
Tawas----------------	0-6	80-120	---	4.5-6.5	0
	6-25	80-120	---	4.5-7.3	0
	25-80	1.0-3.0	---	5.6-8.4	0
Deford---------------	0-6	80-120	---	3.5-6.0	0
	6-80	1.0-5.0	---	4.5-8.4	0
94B:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
94D:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
94E:					
Keweenaw-------------	0-3	3.0-15	---	4.5-6.0	0
	3-25	2.0-10	---	4.5-6.0	0
	25-80	1.0-10	---	4.5-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
95B:					
Liminga--------------	0-4	2.0-5.0	---	3.5-5.5	0
	4-30	2.0-5.0	---	4.5-6.0	0
	30-80	1.0-4.0	---	5.1-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
95D:					
Liminga	0-4	2.0-5.0	---	3.5-5.5	0
	4-30	2.0-5.0	---	4.5-6.0	0
	30-80	1.0-4.0	---	5.1-6.0	0
100E:					
Sayner	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
100F:					
Sayner	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
103D:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Ocqueoc	0-2	---	3.0-14	4.5-6.0	0
	2-7	---	4.0-15	4.5-6.0	0
	7-27	3.0-14	---	4.5-6.5	0
	27-80	6.0-22	---	5.6-7.8	0
Rock outcrop	0-80	---	---	---	---
104C:					
Fence	0-3	4.0-20	---	3.6-6.0	0
	3-7	---	2.0-15	3.6-6.0	0
	7-19	---	3.0-15	3.6-6.0	0
	19-42	2.0-15	---	5.2-7.3	0
	42-80	---	1.0-13	5.1-7.3	0
105C:					
Munising	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
106B:					
Sagola	0-5	3.0-10	---	5.1-6.0	0
	5-20	1.0-5.0	---	5.1-6.0	0
	20-56	1.0-5.0	---	6.6-7.8	0
	56-80	1.0-5.0	---	6.6-7.8	1-10
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
106D:					
Sagola---------------	0-5	3.0-10	---	5.1-6.0	0
	5-20	1.0-5.0	---	5.1-6.0	0
	20-56	1.0-5.0	---	6.6-7.8	0
	56-80	1.0-5.0	---	6.6-7.8	1-10
Rubicon--------------	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
107B:					
Goodman--------------	0-4	---	2.0-10	4.5-5.5	0
	4-30	---	4.0-15	4.5-6.0	0
	30-71	---	0.0-10	4.5-6.0	0
	71-80	0.0-10	---	5.1-6.5	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
107D:					
Goodman--------------	0-4	---	2.0-10	4.5-5.5	0
	4-30	---	4.0-15	4.5-6.0	0
	30-71	---	0.0-10	4.5-6.0	0
	71-80	0.0-10	---	5.1-6.5	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
107F:					
Goodman--------------	0-4	---	2.0-10	4.5-5.5	0
	4-30	---	4.0-15	4.5-6.0	0
	30-71	---	0.0-10	4.5-6.0	0
	71-80	0.0-10	---	5.1-6.5	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
108B:					
Goodman--------------	0-4	---	2.0-10	4.5-5.5	0
	4-30	---	4.0-15	4.5-6.0	0
	30-71	---	0.0-10	4.5-6.0	0
	71-80	0.0-10	---	5.1-6.5	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
Wabeno---------------	0-3	---	3.0-15	4.5-5.5	0
	3-23	2.0-10	---	4.5-6.0	0
	23-29	1.0-15	---	5.1-6.5	0
	29-57	1.0-15	---	5.1-6.5	0
	57-80	1.0-10	---	4.5-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
108D:					
Goodman	0-4	---	2.0-10	4.5-5.5	0
	4-30	---	4.0-15	4.5-6.0	0
	30-71	---	0.0-10	4.5-6.0	0
	71-80	0.0-10	---	5.1-6.5	0
Sundog	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
Wabeno	0-3	---	3.0-15	4.5-5.5	0
	3-23	2.0-10	---	4.5-6.0	0
	23-29	1.0-15	---	5.1-6.5	0
	29-57	1.0-15	---	5.1-6.5	0
	57-80	1.0-10	---	4.5-6.5	0
109B:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Keweenaw	0-4	3.0-15	---	4.5-6.0	0
	4-12	2.0-10	---	4.5-6.0	0
	12-23	1.0-10	---	4.5-6.5	0
	23-80	---	---	---	---
109D:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Keweenaw	0-4	3.0-15	---	4.5-6.0	0
	4-12	2.0-10	---	4.5-6.0	0
	12-23	1.0-10	---	4.5-6.5	0
	23-80	---	---	---	---
109F:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Keweenaw	0-4	3.0-15	---	4.5-6.0	0
	4-12	2.0-10	---	4.5-6.0	0
	12-23	1.0-10	---	4.5-6.5	0
	23-80	---	---	---	---
110B:					
Nadeau	0-7	5.0-15	---	5.6-7.3	0
	7-17	2.0-10	---	5.6-7.3	0
	17-23	3.0-10	---	5.6-7.8	0
	23-80	1.0-2.0	---	7.9-8.4	10-25
Mancelona	0-3	2.0-15	---	5.1-6.0	0
	3-33	1.0-10	---	5.6-7.3	0
	33-37	4.0-15	---	6.1-7.8	---
	37-80	1.0-4.0	---	7.4-8.4	10-25

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
110D:					
Nadeau---------------	0-7	5.0-15	---	5.6-7.3	0
	7-17	2.0-10	---	5.6-7.3	0
	17-23	3.0-10	---	5.6-7.8	0
	23-80	1.0-2.0	---	7.9-8.4	10-25
Mancelona------------	0-3	2.0-15	---	5.1-6.0	0
	3-33	1.0-10	---	5.6-7.3	0
	33-37	4.0-15	---	6.1-7.8	---
	37-80	1.0-4.0	---	7.4-8.4	10-25
111B:					
Grayling-------------	0-3	---	2.0-14	3.5-5.5	0
	3-23	---	1.0-4.0	3.5-5.5	0
	23-80	---	1.0-2.0	3.5-6.5	0
112D:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.1-6.0	0
	31-80	1.0-5.0	---	5.1-6.0	0
Michigamme-----------	0-5	---	5.0-15	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
112F:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.1-6.0	0
	31-80	1.0-5.0	---	5.1-6.0	0
Michigamme-----------	0-5	---	5.0-15	2.0-8.0	0
	5-24	---	3.0-15	2.0-8.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop---------	0-80	---	---	---	---
113B:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0
113D:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0
113F:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
114B:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0
114D:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0
114F:					
Vanriper-------------	0-3	---	4.0-15	3.5-5.0	0
	3-20	2.0-10	---	3.5-6.0	0
	20-80	2.0-10	---	5.1-6.5	0
117B:					
Fence----------------	0-3	4.0-20	---	3.6-6.0	0
	3-7	---	2.0-15	3.6-6.0	0
	7-19	---	3.0-15	3.6-6.0	0
	19-42	2.0-15	---	5.2-7.3	0
	42-80	---	1.0-13	5.1-7.3	0
118A:					
Croswell-------------	0-7	---	1.0-5.0	3.5-5.5	0
	7-34	---	1.0-4.0	3.5-5.5	0
	34-80	1.0-2.0	---	3.5-6.5	0
Deford---------------	0-6	80-120	---	3.5-6.0	0
	6-80	1.0-5.0	---	4.5-8.4	0
119B:					
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
119D:					
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
121B:					
Onota----------------	0-2	3.0-15	---	4.5-6.0	0
	2-7	2.0-10	---	4.5-6.0	0
	7-22	2.0-10	---	5.1-6.5	0
	22-32	---	---	---	---
122:					
Pleine---------------	0-9	80-140	---	5.1-6.5	0
	9-20	4.0-16	---	5.1-6.5	0
	20-33	6.0-11	---	5.1-6.5	0
	33-80	6.0-11	---	5.6-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
123A:					
Tula------------------	0-8	6.0-12	---	5.1-6.0	0
	8-20	6.0-12	---	5.1-6.0	0
	20-28	6.0-12	---	5.1-6.0	0
	28-62	4.0-16	---	5.1-6.5	0
	62-80	6.0-12	---	5.6-6.5	0
124B:					
Gogebic--------------	0-5	---	5.0-20	3.5-6.0	0
	5-18	---	1.0-15	3.5-6.0	0
	18-62	---	1.0-15	4.5-6.0	0
	62-80	1.0-10	---	5.1-6.5	0
Dishno---------------	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
124D:					
Gogebic--------------	0-5	---	5.0-20	3.5-6.0	0
	5-18	---	1.0-15	3.5-6.0	0
	18-62	---	1.0-15	4.5-6.0	0
	62-80	1.0-10	---	5.1-6.5	0
Dishno---------------	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
125D:					
Keweenaw-------------	0-4	3.0-15	---	4.5-6.0	0
	4-12	2.0-10	---	4.5-6.0	0
	12-23	1.0-10	---	4.5-6.5	0
	23-80	---	---	---	---
Kalkaska-------------	0-6	---	1.0-15	3.5-6.0	0
	6-8	---	4.0-15	3.5-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Rock outcrop---------	0-80	---	---	---	---
125F:					
Keweenaw-------------	0-4	3.0-15	---	4.5-6.0	0
	4-12	2.0-10	---	4.5-6.0	0
	12-23	1.0-10	---	4.5-6.5	0
	23-80	---	---	---	---
Kalkaska-------------	0-6	---	1.0-15	3.5-6.0	0
	6-8	---	4.0-15	3.5-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Rock outcrop---------	0-80	---	---	---	---
126B:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
126D:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
126E:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
127B:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
127D:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
127F:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
128B:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
128D:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
128E:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
129C:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
129C:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
130A:					
Chabeneau------------	0-5	---	4.0-20	3.5-6.0	0
	5-22	2.0-10	---	5.1-6.0	0
	22-80	1.0-5.0	---	5.1-6.5	0
131:					
Witbeck--------------	0-8	---	50-90	4.5-6.0	0
	8-15	---	30-40	4.5-6.0	0
	15-22	---	1.0-8.0	4.5-6.0	0
	22-80	1.0-3.0	---	5.1-6.5	0
Cathro---------------	0-18	150-230	---	4.5-7.3	0
	18-31	150-230	---	4.5-7.3	0
	31-80	2.0-20	---	5.6-8.4	5-25
132.					
Slickens					
133B:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.6-6.0	0
	31-80	1.0-5.0	---	5.6-6.0	0
Dishno---------------	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
133D:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.6-6.0	0
	31-80	1.0-5.0	---	5.6-6.0	0
Dishno---------------	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
134B:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.6-6.0	0
	31-80	1.0-5.0	---	5.6-6.0	0
134D:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.6-6.0	0
	31-80	1.0-5.0	---	5.6-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
134F:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.6-6.0	0
	31-80	1.0-5.0	---	5.6-6.0	0
135A:					
Witbeck-------------	0-8	---	50-90	4.5-6.0	0
	8-15	---	30-40	4.5-6.0	0
	15-22	---	1.0-8.0	4.5-6.0	0
	22-80	1.0-3.0	---	5.1-6.5	0
Net------------------	0-5	---	6.0-25	3.5-6.0	0
	5-18	---	6.0-12	3.5-6.0	0
	18-45	---	1.0-6.0	3.5-6.0	0
	45-80	1.0-3.0	---	5.1-6.5	0
136A:					
Minocqua-------------	0-5	120-190	---	4.5-6.0	0
	5-23	2.0-20	---	4.5-6.5	0
	23-80	0.0-3.0	---	5.1-7.8	0
Channing-------------	0-9	---	6.0-10	4.5-6.0	0
	9-22	---	2.0-14	4.5-6.0	0
	22-80	1.0-2.0	---	5.1-6.5	0
137D:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.1-6.0	0
	31-80	1.0-5.0	---	5.1-6.0	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
137F:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.1-6.0	0
	31-80	1.0-5.0	---	5.1-6.0	0
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
138D:					
Sundog---------------	0-2	10-20	---	4.5-6.0	0
	2-22	4.0-12	---	4.5-6.0	0
	22-80	1.0-5.0	---	5.1-6.0	0
Rock outcrop---------	0-80	---	---	---	---
138F:					
Sundog---------------	0-2	10-20	---	5.1-6.0	0
	2-22	4.0-12	---	5.1-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
Rock outcrop---------	0-80	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
139B:					
Sundog	0-2	10-20	---	5.1-6.0	0
	2-22	4.0-12	---	5.1-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
139D:					
Sundog	0-2	10-20	---	5.1-6.0	0
	2-22	4.0-12	---	5.1-6.0	0
	22-80	1.0-5.0	---	5.3-6.0	0
140B:					
Champion	0-5	---	5.0-15	3.5-6.0	0
	5-26	---	2.0-10	3.5-6.0	0
	26-43	---	1.0-2.0	3.5-6.0	0
	43-80	---	0.0-1.0	3.5-6.0	0
Dishno	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
140D:					
Champion	0-5	---	5.0-15	3.5-6.0	0
	5-26	---	2.0-10	3.5-6.0	0
	26-43	---	1.0-2.0	3.5-6.0	0
	43-80	---	0.0-1.0	3.5-6.0	0
Dishno	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
141D:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.5-5.5	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-6.0	---
Rock outcrop	0-80	---	---	---	---
142B:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.5-5.5	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-6.0	---
142D:					
Pelissier	0-6	---	2.0-10	3.5-5.5	---
	6-10	---	1.0-5.0	4.5-6.0	---
	10-21	---	1.0-4.0	5.1-6.0	---
	21-80	---	1.0-2.0	5.1-5.5	---
144B:					
Farquar	0-6	---	2.0-10	4.5-6.0	0
	6-9	2.0-10	---	5.1-6.0	0
	9-20	1.0-5.0	---	5.1-6.0	0
	20-36	1.0-4.0	---	5.1-6.0	0
	36-80	1.0-4.0	---	5.1-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
145C:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
146B:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
Skanee---------------	0-7	---	5.0-20	3.5-6.0	0
	7-12	---	5.0-15	3.5-6.0	0
	12-30	---	5.0-10	3.5-6.0	0
	30-80	---	1.0-4.0	4.5-6.0	0
147A:					
Skanee---------------	0-7	---	5.0-20	3.5-6.0	0
	7-12	---	5.0-15	3.5-6.0	0
	12-30	---	5.0-10	3.5-6.0	0
	30-80	---	1.0-4.0	4.5-6.0	0
Gay------------------	0-2	50-90	---	5.1-6.0	0
	2-18	12-20	---	5.1-6.0	0
	18-31	1.0-8.0	---	5.1-6.0	0
	31-80	1.0-3.0	---	5.1-7.3	0
148B:					
Shoepac--------------	0-6	---	5.0-15	3.5-6.0	---
	6-23	---	3.0-11	3.5-6.0	---
	23-53	3.0-9.0	---	5.1-6.5	---
	53-80	1.0-3.0	---	7.4-8.4	---
Ensley---------------	0-5	150-200	---	6.1-7.3	0
	5-19	4.0-8.0	---	6.1-7.3	0
	19-80	1.0-4.0	---	7.4-8.4	10-20
149:					
Evart----------------	0-10	5.0-20	---	6.1-7.3	0
	10-80	1.0-3.0	---	6.1-8.4	0-10
Cathro---------------	0-18	150-230	---	4.5-7.3	0
	18-31	150-230	---	4.5-7.3	0
	31-80	2.0-20	---	5.6-8.4	5-25
150:					
Shag-----------------	0-2	80-140	---	5.6-7.3	0
	2-11	2.0-20	---	5.6-7.3	0
	11-25	2.0-10	---	6.6-7.8	0
	25-80	2.0-20	---	6.6-7.8	0
151A:					
Spear----------------	0-2	---	4.0-15	4.5-6.0	0
	2-6	---	2.0-12	4.5-5.5	0
	6-31	6.0-14	---	5.1-6.0	0
	31-80	2.0-22	---	5.6-7.3	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
153D:					
Ishpeming	0-6	---	2.0-10	4.5-6.0	0
	6-24	---	3.0-15	4.5-6.0	0
	24-38	---	3.0-15	4.5-6.0	---
	38-60	---	---	---	---
Rock outcrop	0-80	---	---	---	---
153F:					
Ishpeming	0-6	---	2.0-10	4.5-6.0	0
	6-24	---	3.0-15	4.5-6.0	0
	24-38	---	3.0-15	4.5-6.0	---
	38-60	---	---	---	---
Rock outcrop	0-80	---	---	---	---
154B:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Sayner	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
154D:					
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Sayner	0-2	2.0-10	---	4.5-6.0	0
	2-14	---	2.0-8.0	4.5-6.0	0
	14-27	0.0-4.0	---	4.5-6.5	0
	27-80	0.0-3.0	---	5.1-6.5	0
155A:					
Zeba	0-14	---	5.0-15	4.5-6.0	0
	14-31	---	1.0-10	4.5-6.0	0
	31-41	---	---	---	---
Jacobsville	0-4	80-120	---	4.5-6.0	0
	4-9	1.0-10	---	4.5-6.0	0
	9-16	1.0-5.0	---	5.1-6.5	0
	16-28	1.0-5.0	---	5.1-6.5	0
	28-38	---	---	---	---
156B:					
Duel	0-2	3.0-10	---	5.1-6.0	---
	2-22	1.0-5.0	---	5.1-6.0	---
	22-32	---	---	---	---
	32-40	---	---	---	---
157B:					
Reade	0-7	---	4.0-16	4.5-5.5	0
	7-15	---	2.0-10	4.5-6.0	0
	15-28	2.0-10	---	5.6-7.8	0
	28-38	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
157B:					
Nahma----------------	0-11	80-120	---	6.1-7.3	0
	11-14	2.0-10	---	6.1-7.3	0
	14-24	2.0-10	---	6.6-8.4	5-30
	24-34	---	---	---	---
158C:					
Munising-------------	0-6	---	3.0-15	4.5-6.0	0
	6-18	---	2.0-5.0	4.5-6.0	0
	18-50	---	1.0-8.0	4.5-6.0	0
	50-80	1.0-6.0	---	5.6-6.5	0
Onota----------------	0-2	3.0-15	---	4.5-6.0	0
	2-7	2.0-10	---	4.5-6.0	0
	7-22	2.0-10	---	5.1-6.5	0
	22-32	---	---	---	---
Yalmer---------------	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
159A:					
Jeske----------------	0-11	---	1.0-3.0	4.5-5.5	0
	11-21	---	1.0-3.0	4.5-5.5	0
	21-31	---	---	---	---
	31-60	---	---	---	---
160B:					
Paquin---------------	0-11	---	3.0-5.0	3.5-5.5	---
	11-12	---	1.0-4.0	3.5-6.0	---
	12-14	1.0-2.0	---	3.5-6.0	---
	14-36	1.0-2.0	---	5.1-6.5	---
	36-80	3.0-5.0	---	5.1-6.5	---
Finch----------------	0-10	---	5.0-20	3.5-6.0	0
	10-20	---	1.0-4.0	3.5-6.0	0
	20-29	---	1.0-4.0	3.5-6.0	0
	29-80	1.0-4.0	---	5.1-6.0	0
161B:					
Yellowdog------------	0-32	---	1.0-2.0	4.5-6.0	0
	32-60	---	---	---	---
162B:					
Buckroe--------------	0-4	---	4.0-15	4.5-6.0	0
	4-15	---	4.0-15	4.5-6.0	0
	15-25	---	0.0-0.0	---	0
165B:					
Chocolay-------------	0-8	---	5.0-20	4.5-5.5	0
	8-14	3.0-10	---	5.1-6.0	0
	14-27	5.0-20	---	5.1-6.5	0
	27-37	---	---	---	---
Waiska---------------	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
166:					
Skandia	0-4	---	120-190	4.5-5.0	0
	4-26	120-190	---	5.6-6.0	0
	26-31	---	---	---	---
	31-41	---	---	---	---
167:					
Skandia	0-4	---	120-190	4.5-5.0	0
	4-26	120-190	---	5.6-6.0	0
	26-31	---	---	---	---
	31-41	---	---	---	---
Jacobsville	0-4	80-120	---	4.5-6.0	0
	4-9	1.0-10	---	4.5-6.0	0
	9-16	1.0-5.0	---	5.1-6.5	0
	16-28	1.0-5.0	---	5.1-6.5	0
	28-38	---	---	---	---
168B:					
Yellowdog	0-32	---	1.0-2.0	4.5-6.0	0
	32-60	---	---	---	---
Burt	0-7	---	20-45	4.5-6.0	0
	7-18	---	1.0-3.0	4.5-6.0	0
	18-28	---	---	---	---
170B:					
Chocolay	0-8	---	5.0-20	4.5-5.5	0
	8-14	3.0-10	---	5.1-6.0	0
	14-27	5.0-20	---	5.1-6.5	0
	27-37	---	---	---	---
171B:					
Paavola	0-8	---	4.0-15	3.5-6.0	0
	8-33	1.0-12	---	4.5-6.0	0
	33-80	1.0-5.0	---	4.5-6.5	0
172D:					
Buckroe	0-4	---	4.0-15	3.5-6.0	0
	4-15	---	4.0-15	4.5-6.0	0
	15-25	---	---	---	---
Rock outcrop	0-80	---	---	---	---
172F:					
Buckroe	0-4	---	4.0-15	3.5-6.0	0
	4-15	---	4.0-15	4.5-6.0	0
	15-25	---	---	---	---
Rock outcrop	0-80	---	---	---	---
173B:					
Pence	0-6	3.0-15	---	4.5-6.0	0
	6-13	---	2.0-15	4.5-6.0	0
	13-31	0.0-10	---	4.5-6.5	0
	31-80	0.0-4.0	---	5.1-6.5	0
173D:					
Pence	0-6	3.0-15	---	4.5-6.0	0
	6-13	---	2.0-15	4.5-6.0	0
	13-31	0.0-10	---	4.5-6.5	0
	31-80	0.0-4.0	---	5.1-6.5	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
174D:					
Yalmer	0-10	---	5.0-10	3.5-6.0	0
	10-30	---	1.0-10	3.5-6.0	0
	30-80	---	2.0-10	4.5-6.0	0
Rubicon	0-7	---	1.0-6.0	4.5-6.0	0
	7-18	---	1.0-4.0	4.5-6.0	0
	18-80	1.0-2.0	---	4.5-6.5	0
Urban land.					
175E:					
Kalkaska	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Waiska	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
175F:					
Kalkaska	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Waiska	0-4	---	3.0-15	4.5-6.0	0
	4-36	---	2.0-10	4.5-6.0	0
	36-80	---	1.0-5.0	4.5-6.0	0
176B:					
Greenwood	0-8	---	80-120	3.6-4.4	0
	8-80	---	150-230	3.6-4.4	0
Croswell	0-7	---	1.0-5.0	3.5-5.5	0
	7-34	---	1.0-4.0	3.5-5.5	0
	34-80	1.0-2.0	---	3.5-6.5	0
177E:					
Frohling	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
177F:					
Frohling	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
178D:					
Schweitzer	0-5	---	2.0-20	3.5-5.5	0
	5-21	---	2.0-20	4.5-6.0	0
	21-43	1.0-10	---	5.1-6.0	0
	43-61	1.0-10	---	5.1-6.0	0
	61-80	1.0-10	---	5.6-6.5	0
Kalkaska	0-6	---	1.0-15	3.5-6.0	0
	6-8	---	4.0-15	3.5-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Rock outcrop	0-80	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
178F:					
Schweitzer-----------	0-5	---	2.0-20	3.5-5.5	0
	5-21	---	2.0-20	4.5-6.0	0
	21-43	1.0-10	---	5.1-6.0	0
	43-61	1.0-10	---	5.1-6.0	0
	61-80	1.0-10	---	5.6-6.5	0
Kalkaska-------------	0-6	---	1.0-15	3.5-6.0	0
	6-8	---	4.0-15	3.5-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Rock outcrop---------	0-80	---	---	---	---
179E:					
Schweitzer-----------	0-5	---	2.0-20	3.5-5.5	0
	5-21	---	2.0-20	4.5-6.0	0
	21-43	1.0-10	---	5.1-6.0	0
	43-61	1.0-10	---	5.1-6.0	0
	61-80	1.0-10	---	5.6-6.5	0
Michigamme-----------	0-5	---	5.0-15	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
180E:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Frohling-------------	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
180F:					
Kalkaska-------------	0-6	---	1.0-15	3.6-6.0	0
	6-8	---	4.0-15	3.6-6.0	0
	8-17	---	2.0-5.0	4.5-6.0	0
	17-80	1.0-2.0	---	4.5-6.5	0
Frohling-------------	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
181E:					
Frohling-------------	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
Tokiahok-------------	0-11	---	10-15	4.5-5.5	0
	11-24	---	1.0-10	4.5-5.5	0
	24-49	2.0-10	---	5.1-6.5	0
	49-59	1.0-10	---	5.6-6.5	0
	59-80	1.0-10	---	5.1-6.5	0
181F:					
Frohling-------------	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
181F:					
Tokiahok	0-11	---	10-15	4.5-5.5	0
	11-24	---	1.0-10	4.5-5.5	0
	24-49	2.0-10	---	5.1-6.5	0
	49-59	1.0-10	---	5.6-6.5	0
	59-80	1.0-10	---	5.1-6.5	0
184C:					
Dishno	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
Witbeck	0-8	---	50-90	4.5-6.0	0
	8-15	---	30-40	4.5-6.0	0
	15-22	---	1.0-8.0	4.5-6.0	0
	22-80	1.0-3.0	---	5.1-6.5	0
Rock outcrop	0-80	---	---	---	---
185B:					
Northland	0-5	2.0-6.0	---	5.1-6.5	0
	5-8	2.0-6.0	---	5.1-7.3	0
	8-18	4.0-11	---	6.6-7.8	0
	18-80	1.0-3.0	---	6.6-8.4	10-25
187B:					
Reade	0-7	---	4.0-16	4.5-5.5	0
	7-15	---	2.0-10	4.5-6.0	0
	15-28	2.0-10	---	5.6-7.8	0
	28-38	---	---	---	---
190B:					
Emmet	0-3	10-20	---	5.6-6.5	0
	3-21	2.0-6.0	---	5.6-6.5	0
	21-28	3.0-9.0	---	6.6-7.8	1-8
	28-80	1.0-3.0	---	7.4-8.4	10-30
Cunard	0-4	3.0-15	---	5.6-7.3	0
	4-19	1.0-10	---	5.6-7.8	0
	19-27	1.0-10	---	7.4-8.4	5-30
	27-37	---	---	---	---
191B:					
Nahma	0-11	80-120	---	6.1-7.3	0
	11-14	2.0-10	---	6.1-7.3	0
	14-24	2.0-10	---	6.6-8.4	5-30
	24-34	---	---	---	---
Sundell	0-8	10-25	---	6.1-7.3	0
	8-17	1.0-10	---	6.1-7.8	0
	17-22	1.0-10	---	6.1-8.4	0-20
	22-40	---	---	---	---
193E:					
Frohling	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193E:					
Tokiahok-------------	0-11	---	5.0-10	4.5-5.5	0
	11-24	---	1.0-10	4.5-5.5	0
	24-49	2.0-10	---	5.1-6.5	0
	49-59	1.0-10	---	5.6-6.5	0
	59-80	1.0-10	---	5.1-6.5	0
194E:					
Sporley--------------	0-6	---	4.0-15	4.5-6.0	0
	6-16	---	2.0-10	4.5-6.0	0
	16-45	5.0-10	---	4.5-6.5	0
	45-80	3.0-30	---	5.6-8.4	0
196E:					
Frohling-------------	0-7	---	4.0-15	4.5-5.5	0
	7-16	---	2.0-10	4.5-5.5	0
	16-80	2.0-10	---	5.1-6.0	0
Onota----------------	0-2	3.0-15	---	4.5-6.0	0
	2-7	2.0-10	---	4.5-6.0	0
	7-22	2.0-10	---	5.1-6.5	0
	22-32	---	---	---	---
Tokiahok-------------	0-11	---	10-15	4.5-5.5	0
	11-24	---	1.0-10	4.5-5.5	0
	24-49	2.0-10	---	5.1-6.5	0
	49-59	1.0-10	---	5.6-6.5	0
	59-80	1.0-10	---	5.6-6.5	0
197B:					
Shoepac--------------	0-6	---	5.0-15	3.5-6.0	---
	6-23	---	3.0-11	3.5-6.0	---
	23-53	3.0-9.0	---	5.1-6.5	---
	53-80	1.0-3.0	---	7.4-8.4	---
Trenary--------------	0-5	3.0-15	---	4.1-6.0	0
	5-15	1.0-5.0	---	4.1-6.0	0
	15-48	1.0-5.0	---	5.1-7.3	0
	48-80	1.0-10	---	6.6-8.4	1-25
198B:					
Shoepac--------------	0-6	---	5.0-15	3.5-6.0	---
	6-23	---	3.0-11	3.5-6.0	---
	23-53	3.0-9.0	---	5.1-6.5	---
	53-80	1.0-3.0	---	5.6-7.3	---
Reade----------------	0-7	---	4.0-16	4.5-5.5	0
	7-15	---	2.0-10	4.5-6.0	0
	15-28	2.0-10	---	5.6-7.8	0
	28-38	---	---	---	---
199.					
Udorthents, ash					
200A:					
Charlevoix-----------	0-8	10-30	---	4.1-6.0	0
	8-12	5.0-10	---	4.1-6.0	0
	12-28	5.0-10	---	5.6-7.3	0-5
	28-70	2.0-10	---	7.4-8.4	10-30
	70-80	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
200A:					
Ensley	0-5	150-200	---	6.1-7.3	0
	5-19	4.0-8.0	---	6.1-7.3	0
	19-70	1.0-4.0	---	7.4-8.4	10-20
	70-80	---	---	---	---
201B:					
Sauxhead	0-4	---	4.0-15	4.5-5.5	0
	4-14	---	0.0-0.0	5.1-5.5	0
	14-17	---	---	---	---
	17-27	---	---	---	---
Jacobsville	0-4	80-120	---	4.5-6.0	0
	4-9	1.0-10	---	4.5-6.0	0
	9-16	1.0-5.0	---	5.1-6.5	0
	16-28	1.0-5.0	---	5.1-6.5	0
	28-38	---	---	---	---
202B:					
Sauxhead	0-4	---	4.0-15	4.5-5.5	0
	4-14	---	0.0-0.0	5.1-5.5	0
	14-17	---	---	---	---
	17-27	---	---	---	---
203A:					
Au Gres	0-8	---	5.0-10	3.5-5.5	0
	8-27	---	2.0-5.0	3.5-6.0	0
	27-80	1.0-2.0	---	4.5-6.0	0
Deford	0-6	80-120	---	3.5-6.0	0
	6-80	1.0-5.0	---	4.5-8.4	0
204B:					
Gogebic	0-5	---	5.0-20	4.5-6.0	0
	5-18	---	1.0-15	4.5-6.0	0
	18-62	---	1.0-15	4.5-6.0	0
	62-80	1.0-10	---	5.6-6.5	0
Tula	0-8	6.0-12	---	5.1-6.0	0
	8-20	6.0-12	---	5.1-6.0	0
	20-28	6.0-12	---	5.1-6.0	0
	28-62	4.0-16	---	5.1-6.5	0
	62-80	6.0-12	---	5.6-6.5	0
206B:					
Traunik	0-4	4.0-15	---	5.1-6.0	0
	4-11	2.0-8.0	---	5.1-6.0	0
	11-31	0.0-8.0	---	5.6-7.8	0
	31-80	0.0-4.0	---	6.6-7.8	0
207D:					
Dishno	0-9	---	2.0-10	3.5-5.5	0
	9-22	---	2.0-10	3.5-5.5	0
	22-46	---	1.0-10	4.5-6.0	0
	46-50	---	---	---	---
Michigamme	0-5	---	5.0-15	3.5-6.0	0
	5-24	---	3.0-15	3.5-6.0	0
	24-29	1.0-5.0	---	4.5-6.5	0
	29-39	---	---	---	---
Rock outcrop	0-80	---	---	---	---

Table 19.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
208F:					
Keewaydin------------	0-4	---	2.0-15	3.5-5.5	0
	4-10	---	2.0-10	3.5-5.5	0
	10-20	---	2.0-10	3.5-5.5	0
	20-31	1.0-5.0	---	5.1-6.5	0
	31-80	1.0-5.0	---	5.1-6.5	0
Michigamme-----------	0-5	---	6.0-20	3.5-6.0	0
	5-24	2.0-15	---	4.5-6.0	0
	24-29	2.0-15	---	4.5-6.5	0
	29-39	---	---	---	---
209B:					
Garlic---------------	0-9	---	1.0-8.0	4.5-5.5	0
	9-26	---	1.0-8.0	4.5-6.0	0
	26-80	1.0-10	---	5.1-6.0	0
Fence----------------	0-3	4.0-20	---	3.6-6.0	0
	3-7	---	2.0-15	3.6-6.0	0
	7-19	---	3.0-15	3.6-6.0	0
	19-42	2.0-15	---	5.1-7.3	0
	42-80	---	1.0-13	5.1-7.3	0
M-W.					
Miscellaneous water					
W.					
Water					

Table 20.--Soil Moisture Status by Depth

(Depths of layers are in feet)

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
10B: Grayling--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
10D: Grayling--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
10E: Grayling--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
11C: Deer Park-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
11D: Deer Park-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
12B: Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
12D: Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
12E:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
12F:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
13B:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
13D:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
13E:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
13F:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
14B:													
Rousseau--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
14D: Rousseau--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
15A: Croswell--------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
16A: Paquin----------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
17A: Au Gres---------	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-0.5: Dry 0.5-3.0: Moist 3.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---
18: Kinross---------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
19: Deford----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
20B:													
Rousseau--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ocqueoc---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
20D:													
Rousseau--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ocqueoc---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
20E:													
Rousseau--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ocqueoc---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
22B:													
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
24B:													
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
24D:													
Munising--------	B	0.0-7.0: Moist	0.0-7.0: Moist	0.0-1.5: Moist	0.0-1.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist	0.0-1.0: Dry	0.0-1.5: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist
		---	---	1.5-2.5: Wet	1.0-2.5: Wet	1.5-2.5: Wet	---	1.0-7.0: Moist	1.5-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	---
		---	---	2.5-7.0: Moist	2.5-7.0: Moist	2.5-7.0: Moist	---	---	---	---	2.5-7.0: Moist	2.5-7.0: Moist	---
25B:													
Munising--------	B	0.0-7.0: Moist	0.0-7.0: Moist	0.0-1.5: Moist	0.0-1.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist	0.0-1.0: Dry	0.0-1.5: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist
		---	---	1.5-2.5: Wet	1.0-2.5: Wet	1.5-2.5: Wet	---	1.0-7.0: Moist	1.5-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	---
		---	---	2.5-7.0: Moist	2.5-7.0: Moist	2.5-7.0: Moist	---	---	---	---	2.5-7.0: Moist	2.5-7.0: Moist	---
Yalmer----------	B	0.0-7.0: Moist	0.0-7.0: Moist	0.0-1.5: Moist	0.0-1.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist	0.0-2.0: Dry	0.0-3.0: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist
		---	---	1.5-2.5: Wet	1.0-2.5: Wet	1.5-2.5: Wet	---	2.0-7.0: Moist	3.0-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	---
		---	---	2.5-7.0: Moist	2.5-7.0: Moist	2.5-7.0: Moist	---	---	---	---	2.5-7.0: Moist	2.5-7.0: Moist	---
25D:													
Munising--------	B	0.0-7.0: Moist	0.0-7.0: Moist	0.0-1.5: Moist	0.0-1.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist	0.0-1.0: Dry	0.0-1.5: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist
		---	---	1.5-2.5: Wet	1.0-2.5: Wet	1.5-2.5: Wet	---	1.0-7.0: Moist	1.5-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	---
		---	---	2.5-7.0: Moist	2.5-7.0: Moist	2.5-7.0: Moist	---	---	---	---	2.5-7.0: Moist	2.5-7.0: Moist	---
Yalmer----------	B	0.0-7.0: Moist	0.0-7.0: Moist	0.0-1.5: Moist	0.0-1.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist	0.0-2.0: Dry	0.0-3.0: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-7.0: Moist
		---	---	1.5-2.5: Wet	1.0-2.5: Wet	1.5-2.5: Wet	---	2.0-7.0: Moist	3.0-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	---
		---	---	2.5-7.0: Moist	2.5-7.0: Moist	2.5-7.0: Moist	---	---	---	---	2.5-7.0: Moist	2.5-7.0: Moist	---
26A:													
Skanee----------	C	0.0-5.5: Moist	0.0-5.5: Moist	0.0-1.5: Moist	0.0-0.5: Moist	0.0-2.5: Wet	0.0-1.0: Moist	0.0-5.5: Moist	0.0-0.5: Dry	0.0-7.0: Moist	0.0-2.0: Moist	0.0-1.5: Moist	0.0-5.5: Moist
		5.5-7.0: Wet	5.5-7.0: Wet	1.5-2.5: Wet	0.5-2.5: Wet	2.5-4.5: Moist	1.0-2.5: Wet	5.5-7.0: Wet	0.5-7.0: Moist	---	2.0-2.5: Wet	1.5-2.5: Wet	5.5-7.0: Wet
		---	---	2.5-5.0: Moist	2.5-4.5: Moist	4.5-7.0: Wet	2.5-4.5: Moist	---	---	---	2.5-5.5: Moist	2.5-5.5: Moist	---
		---	---	5.0-7.0: Wet	4.5-7.0: Wet	---	4.5-7.0: Wet	---	---	---	5.5-7.0: Wet	5.5-7.0: Wet	---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
27:													
Gay-------------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
28B:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
28D:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
28E:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
29B:													
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
29D:													
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
31D:													
Trenary---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
32A: Charlevoix------	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---
33: Ensley----------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
34B: Onaway----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
34D: Onaway----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
34E: Onaway----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
35B: Champion--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro- logic group	January	February	March	April	May	June	July	August	September	October	November	December
35D:													
Champion--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
36A:													
Net-------------	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---
37:													
Witbeck---------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
38B:													
Pence-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
38D:													
Pence-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
38E:													
Pence-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
39B: Amasa-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
39D: Amasa-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
39E: Amasa-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
40B: Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
40D: Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
41A: Channing--------	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-0.5: Dry 0.5-3.0: Moist 3.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---
42: Minocqua--------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
43B: Karlin----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
43D: Karlin----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
44B: Carlshend-------	B	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.0: Moist 1.0-1.2: Wet	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.0: Dry 1.0-1.2: Moist	0.0-1.2: Dry ---	0.0-1.2: Moist ---	0.0-1.0: Moist 1.0-1.2: Wet	0.0-1.2: Moist ---	0.0-1.2: Moist ---
45A: Zeba------------	B	0.0-2.0: Moist 2.0-2.6: Wet	0.0-2.0: Moist 2.0-2.6: Wet	0.0-1.5: Moist 1.5-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-2.6: Wet ---	0.0-2.0: Moist 2.0-2.6: Wet	0.0-2.5: Moist 2.5-2.6: Wet	0.0-2.6: Moist ---	0.0-2.5: Moist 2.5-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-1.5: Moist 1.5-2.6: Wet
46: Jacobsville-----	D	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-0.5: Moist 0.5-2.1: Wet	0.0-1.5: Moist 1.5-2.1: Wet	0.0-2.0: Moist 2.0-2.1: Wet	0.0-1.0: Moist 1.0-2.1: Wet	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---
48: Burt------------	D	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-0.5: Moist 0.5-1.5: Wet	0.0-1.5: Moist ---	0.0-1.5: Moist ---	0.0-1.0: Moist 1.0-1.5: Wet	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---
50A: Sundell---------	B	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.5: Moist 1.5-1.8: Wet	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.8: Wet ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.5: Moist 1.5-1.8: Wet

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
51: Nahma-----------	B/D	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-0.5: Moist 0.5-2.0: Wet	0.0-1.5: Moist 1.5-2.0: Wet	0.0-2.0: Moist ---	0.0-1.0: Moist 1.0-2.0: Wet	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---
52B: Summerville-----	D	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.0: Dry 1.0-1.1: Moist	0.0-1.1: Dry ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---	0.0-1.1: Moist ---
55F: Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													
56D: Peshekee--------	D	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.0: Dry 1.0-1.2: Moist	0.0-1.2: Dry ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---
Rock outcrop.													
56E: Peshekee--------	D	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.0: Dry 1.0-1.2: Moist	0.0-1.2: Dry ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---
Rock outcrop.													
56F: Peshekee--------	D	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.0: Dry 1.0-1.2: Moist	0.0-1.2: Dry ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---	0.0-1.2: Moist ---
Rock outcrop.													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
57:													
Carbondale------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Tawas-----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
58:													
Greenwood-------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Dawson----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
59:													
Chippeny--------	D	0.0-3.2: Wet ---	0.0-3.2: Wet ---	0.0-3.2: Wet ---	0.0-3.2: Wet ---	0.0-3.2: Wet ---	0.0-0.5: Moist 0.5-3.2: Wet	0.0-0.5: Moist 0.5-3.2: Wet	0.0-1.0: Moist 1.0-3.2: Wet	0.0-0.5: Moist 0.5-3.2: Wet	0.0-3.2: Wet ---	0.0-3.2: Wet ---	0.0-3.2: Wet ---
Nahma-----------	B/D	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-0.5: Moist 0.5-2.0: Wet	0.0-1.5: Moist 1.5-2.0: Wet	0.0-2.0: Moist ---	0.0-1.0: Moist 1.0-2.0: Wet	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---
60:													
Histosols-------	D	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet
Aquents---------	D	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet	0.0-7.0: Wet
61. Pits, borrow													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro- logic group	January	February	March	April	May	June	July	August	September	October	November	December
62B:													
Udorthents------	---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Udipsamments----	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
64. Pits and Dumps													
65B:													
Udorthents------	---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Urban land.													
66B:													
Udipsamments----	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Urban land.													
67B: Urban land.													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist 0.0-7.0: Moist
68:													
Pits, quarries--	A	---	---	---	---	---	---	---	---	---	---	---	---
69B:													
Escanaba--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
69D:													
Escanaba--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
70B:													
Nadeau----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
70D:													
Nadeau----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
71B:													
Evart-----------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Pelkie----------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
Sturgeon--------	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---
72B:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
72D:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
72E:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
73B:													
Gogebic---------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
73D:													
Gogebic---------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
74D:													
Schweitzer------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
74F:													
Schweitzer------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													
76C:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Voelker---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
76E:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Voelker---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
76F:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Voelker---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
77D:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Voelker---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
77E:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Alcona----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Voelker---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
78C:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
78E:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
78F:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
79B:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
80B:													
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
80D:													
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
80E:													
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
81B:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
81D:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro- logic group	January	February	March	April	May	June	July	August	September	October	November	December
81E:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
84D:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ishpeming-------	A	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-2.0: Dry 2.0-3.2: Moist	0.0-3.0: Dry 3.0-3.2: Moist	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---
Rock outcrop.													
84F:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ishpeming-------	A	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-2.0: Dry 2.0-3.2: Moist	0.0-3.0: Dry 3.0-3.2: Moist	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---
Rock outcrop.													
85A:													
Solona----------	C	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---
86B:													
Mashek----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
87B:													
Cunard----------	B	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---
88:													
Cathro----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Ensley----------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
89B:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Solona----------	C	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---
90B:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Escanaba--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
90D:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro- logic group	January	February	March	April	May	June	July	August	September	October	November	December
90D:													
Escanaba--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
91B:													
Onaway----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Nadeau----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
92A:													
Ensley----------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Solona----------	C	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---
93:													
Tawas-----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Deford----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
94B:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
94B:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
94D:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
94E:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
95B:													
Liminga---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
95D:													
Liminga---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
100E:													
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
100E:													
Rubicon	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
100F:													
Sayner	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
103D:													
Rubicon	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Ocqueoc	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
104C:													
Fence	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
105C:													
Munising	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
106B:													
Sagola----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
106D:													
Sagola----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
107B:													
Goodman---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
107D:													
Goodman---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
107F:													
Goodman----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
108B:													
Goodman----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Wabeno-----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
108D:													
Goodman----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Wabeno-----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
109B:													
Rubicon----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Keweenaw---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
109D:													
Rubicon----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Keweenaw---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
109F:													
Rubicon----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Keweenaw---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
110B:													
Nadeau-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Mancelona--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
110D:													
Nadeau----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Mancelona-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
111B:													
Grayling--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
112D:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													
112F:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
113B:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
113D:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
113F:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
114B:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
114D:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
114F:													
Vanriper--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
117B:													
Fence-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
118A:													
Croswell--------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
Deford----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
119B:													
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
119D:													
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
121B:													
Onota-----------	B	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.0: Dry 1.0-1.8: Moist	0.0-1.5: Dry 1.5-1.8: Moist	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
122:													
Pleine----------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
123A:													
Tula------------	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---
124B:													
Gogebic---------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
124D:													
Gogebic---------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
125D:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
125F:													
Keweenaw--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
126B:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
126D:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
126E:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
127B:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
127D:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
127F:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
128B:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
128D:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
128E:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
128E:													
Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
129C:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
130A:													
Chabeneau-------	B	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
131:													
Witbeck---------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Cathro----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
132. Slickens													
133B:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
133B:													
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
133D:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
134B:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
134D:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
134F:													
Keewaydin-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
135A:													
Witbeck---------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
135A:													
Net	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---
136A:													
Minocqua	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Channing	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-0.5: Dry 0.5-3.0: Moist 3.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---
137D:													
Keewaydin	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
137F:													
Keewaydin	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sundog	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
138D:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
138F:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
139B:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
139D:													
Sundog----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
140B:													
Champion--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
140D:													
Champion--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
141D:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
142B:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
142D:													
Pelissier-------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
144B:													
Farquar---------	B	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
145C:													
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
146B:													
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Skanee----------	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---
147A:													
Skanee----------	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
147A:													
Gay-------------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
148B:													
Shoepac---------	C	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
Ensley----------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
149:													
Evart-----------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Cathro----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
150:													
Shag------------	D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
151A:													
Spear-----------	C	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-7.0: Wet	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
153D:													
Ishpeming-------	A	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-2.0: Dry 2.0-3.2: Moist	0.0-3.0: Dry 3.0-3.2: Moist	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---
Rock outcrop.													
153F:													
Ishpeming-------	A	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-2.0: Dry 2.0-3.2: Moist	0.0-3.0: Dry 3.0-3.2: Moist	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---	0.0-3.2: Moist ---
Rock outcrop.													
154B:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
154D:													
Rubicon---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Sayner----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
155A:													
Zeba------------	B	0.0-2.0: Moist 2.0-2.6: Wet	0.0-2.0: Moist 2.0-2.6: Wet	0.0-1.5: Moist 1.5-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-2.6: Wet ---	0.0-2.0: Moist 2.0-2.6: Wet	0.0-2.5: Moist 2.5-2.6: Wet	0.0-2.6: Moist ---	0.0-2.5: Moist 2.5-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-1.0: Moist 1.0-2.6: Wet	0.0-1.5: Moist 1.5-2.6: Wet

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
155A:													
Jacobsville-----	D	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-0.5: Moist 0.5-2.1: Wet	0.0-1.5: Moist 1.5-2.1: Wet	0.0-2.0: Moist 2.0-2.1: Wet	0.0-1.0: Moist 1.0-2.1: Wet	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---
156B:													
Duel------------	A	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Dry	0.0-1.8: Dry	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist	0.0-1.8: Moist
157B:													
Reade-----------	B	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.0: Moist 2.0-2.3: Wet	0.0-1.0: Moist 1.0-2.3: Wet	0.0-1.5: Moist 1.5-2.3: Wet	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-1.0: Moist 1.0-2.3: Wet	0.0-2.0: Moist 2.0-2.3: Wet	0.0-2.3: Moist ---
Nahma-----------	B/D	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-0.5: Moist 0.5-2.0: Wet	0.0-1.5: Moist 1.5-2.0: Wet	0.0-2.0: Moist ---	0.0-1.0: Moist 1.0-2.0: Wet	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---
158C:													
Munising--------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Onota-----------	B	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.0: Dry 1.0-1.8: Moist	0.0-1.5: Dry 1.5-1.8: Moist	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---
Yalmer----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
159A:													
Jeske-----------	C	0.0-1.7: Moist ---	0.0-1.7: Moist ---	0.0-1.5: Moist 1.5-1.7: Wet	0.0-1.0: Moist 1.0-1.7: Wet	0.0-1.7: Wet ---	0.0-1.7: Moist ---	0.0-1.7: Moist ---	0.0-1.7: Moist ---	0.0-1.7: Moist ---	0.0-1.0: Moist 1.0-1.7: Wet	0.0-1.0: Moist 1.0-1.7: Wet	0.0-1.5: Moist 1.5-1.7: Wet

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
160B:													
Paquin----------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.5: Moist 5.5-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
Finch-----------	C	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-0.5: Dry 0.5-3.0: Moist 3.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---
161B:													
Yellowdog-------	A	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.0: Dry 2.0-2.7: Moist	0.0-2.7: Dry ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---
162B:													
Buckroe---------	A	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Dry	0.0-1.2: Dry	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist
165B:													
Chocolay--------	A	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.0: Moist 2.0-2.3: Wet	0.0-1.0: Moist 1.0-2.3: Wet	0.0-1.5: Moist 1.5-2.3: Wet	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-1.0: Moist 1.0-2.3: Wet	0.0-2.0: Moist 2.0-2.3: Wet	0.0-2.3: Moist ---
Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
166:													
Skandia---------	D	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-0.5: Moist 0.5-2.2: Wet	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
167:													
Skandia---------	D	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-0.5: Moist 0.5-2.2: Wet	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---	0.0-2.2: Wet ---
Jacobsville-----	D	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-0.5: Moist 0.5-2.1: Wet	0.0-1.5: Moist 1.5-2.1: Wet	0.0-2.0: Moist 2.0-2.1: Wet	0.0-1.0: Moist 1.0-2.1: Wet	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---
168B:													
Yellowdog-------	A	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.0: Dry 2.0-2.7: Moist	0.0-2.7: Dry ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---	0.0-2.7: Moist ---
Burt------------	D	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-0.5: Moist 0.5-1.5: Wet	0.0-1.5: Moist ---	0.0-1.5: Moist ---	0.0-1.0: Moist 1.0-1.5: Wet	0.0-1.5: Wet ---	0.0-1.5: Wet ---	0.0-1.5: Wet ---
170B:													
Chocolay--------	A	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.0: Moist 2.0-2.3: Wet	0.0-1.0: Moist 1.0-2.3: Wet	0.0-1.5: Moist 1.5-2.3: Wet	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-1.0: Moist 1.0-2.3: Wet	0.0-2.0: Moist 2.0-2.3: Wet	0.0-2.3: Moist ---
171B:													
Paavola---------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
172D:													
Buckroe---------	A	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Dry	0.0-1.2: Dry	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist
Rock outcrop.													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
172F:													
Buckroe----------	A	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Dry	0.0-1.2: Dry	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist	0.0-1.2: Moist
Rock outcrop.													
173B:													
Pence------------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
173D:													
Pence------------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
174D:													
Yalmer-----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-2.0: Dry 2.0-7.0: Moist ---	0.0-3.0: Dry 3.0-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Rubicon----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Urban land.													
175E:													
Kalkaska---------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Waiska-----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
175F:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Waiska----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
176B:													
Greenwood-------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Croswell--------	A	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-5.0: Moist 5.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-3.5: Moist 3.5-7.0: Wet ---	0.0-1.5: Dry 1.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Dry 2.5-5.0: Moist 5.0-7.0: Wet	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---	0.0-2.5: Moist 2.5-7.0: Wet ---	0.0-3.0: Moist 3.0-7.0: Wet ---
177E:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
177F:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
178D:													
Schweitzer------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro- logic group	January	February	March	April	May	June	July	August	September	October	November	December
178D:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
178F:													
Schweitzer------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Rock outcrop.													
179E:													
Schweitzer------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
180E:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
180F:													
Kalkaska--------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
181E:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Tokiahok--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
181F:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Tokiahok--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
184C:													
Dishno----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
Witbeck---------	B/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-0.5: Moist 0.5-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---
Rock outcrop.													

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
185B:													
Northland-------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
187B:													
Reade-----------	B	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.0: Moist 2.0-2.3: Wet	0.0-1.0: Moist 1.0-2.3: Wet	0.0-1.5: Moist 1.5-2.3: Wet	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-1.0: Moist 1.0-2.3: Wet	0.0-2.0: Moist 2.0-2.3: Wet	0.0-2.3: Moist ---
190B:													
Emmet-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Cunard----------	B	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.3: Moist ---
191B:													
Nahma-----------	B/D	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-0.5: Moist 0.5-2.0: Wet	0.0-1.5: Moist 1.5-2.0: Wet	0.0-2.0: Moist ---	0.0-1.0: Moist 1.0-2.0: Wet	0.0-2.0: Wet ---	0.0-2.0: Wet ---	0.0-2.0: Wet ---
Sundell---------	B	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.5: Moist 1.5-1.8: Wet	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.8: Wet ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.0: Moist 1.0-1.8: Wet	0.0-1.5: Moist 1.5-1.8: Wet
193E:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Tokiahok--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydro-logic group	January	February	March	April	May	June	July	August	September	October	November	December
194E:													
Sporley---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
196E:													
Frohling--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Onota-----------	B	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.0: Dry 1.0-1.8: Moist	0.0-1.5: Dry 1.5-1.8: Moist	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---	0.0-1.8: Moist ---
Tokiahok--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
197B:													
Shoepac---------	C	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
Trenary---------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
198B:													
Shoepac---------	C	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
Reade-----------	B	0.0-2.3: Moist ---	0.0-2.3: Moist ---	0.0-2.0: Moist 2.0-2.3: Wet	0.0-1.0: Moist 1.0-2.3: Wet	0.0-1.5: Moist 1.5-2.3: Wet	0.0-2.3: Moist ---	0.0-1.0: Dry 1.0-2.3: Moist	0.0-1.5: Dry 1.5-2.3: Moist	0.0-2.3: Moist ---	0.0-1.0: Moist 1.0-2.3: Wet	0.0-2.0: Moist 2.0-2.3: Wet	0.0-2.3: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
199. Udorthents, ash													
200A:													
Charlevoix------	B	0.0-1.5: Moist 1.5-5.8: Wet ---	0.0-1.5: Moist 1.5-5.8: Wet ---	0.0-1.5: Moist 1.5-5.8: Wet ---	0.0-1.0: Moist 1.0-5.8: Wet ---	0.0-0.5: Moist 0.5-5.8: Wet ---	0.0-2.0: Moist 2.0-5.8: Wet ---	0.0-2.5: Moist 2.5-5.8: Wet ---	0.0-0.5: Dry 0.5-4.0: Moist 4.0-5.8: Wet	0.0-2.5: Moist 2.5-5.8: Wet ---	0.0-1.5: Moist 1.5-5.8: Wet ---	0.0-1.0: Moist 1.0-5.8: Wet ---	0.0-1.0: Moist 1.0-5.8: Wet ---
Ensley----------	B/D	0.0-5.8: Wet ---	0.0-5.8: Wet ---	0.0-5.8: Wet ---	0.0-5.8: Wet ---	0.0-5.8: Wet ---	0.0-0.5: Moist 0.5-5.8: Wet	0.0-1.0: Moist 1.0-5.8: Wet	0.0-2.0: Moist 2.0-5.8: Wet	0.0-1.5: Moist 1.5-5.8: Wet	0.0-0.5: Moist 0.5-5.8: Wet	0.0-5.8: Wet ---	0.0-5.8: Wet ---
201B:													
Sauxhead--------	D	0.0-1.4: Moist ---	0.0-1.4: Moist ---	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.4: Moist ---	0.0-1.4: Moist ---	0.0-1.0: Dry 1.0-1.4: Moist	0.0-1.4: Dry ---	0.0-1.4: Moist ---	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.4: Moist ---	0.0-1.4: Moist ---
Jacobsville-----	D	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-0.5: Moist 0.5-2.1: Wet	0.0-1.5: Moist 1.5-2.1: Wet	0.0-2.0: Moist 2.0-2.1: Wet	0.0-1.0: Moist 1.0-2.1: Wet	0.0-2.1: Wet ---	0.0-2.1: Wet ---	0.0-2.1: Wet ---
202B:													
Sauxhead--------	D	0.0-1.4: Moist ---	0.0-1.4: Moist ---	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.4: Moist ---	0.0-1.4: Moist ---	0.0-1.0: Dry 1.0-1.4: Moist	0.0-1.4: Dry ---	0.0-1.4: Moist ---	0.0-1.0: Moist 1.0-1.4: Wet	0.0-1.4: Moist ---	0.0-1.4: Moist ---
203A:													
Au Gres---------	B	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-0.5: Dry 0.5-3.0: Moist 3.0-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.0: Moist 1.0-7.0: Wet ---	0.0-1.5: Moist 1.5-7.0: Wet ---
Deford----------	A/D	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-0.5: Moist 0.5-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.0: Moist 1.0-7.0: Wet	0.0-7.0: Wet ---	0.0-7.0: Wet ---	0.0-7.0: Wet ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
204B:													
Gogebic----------	B	0.0-7.0: Moist --- ---	0.0-7.0: Moist --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-1.0: Moist 1.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---	0.0-1.0: Dry 1.0-7.0: Moist ---	0.0-1.5: Dry 1.5-7.0: Moist ---	0.0-7.0: Moist --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-7.0: Moist	0.0-1.5: Moist 1.5-2.5: Wet 2.5-7.0: Moist	0.0-7.0: Moist --- ---
Tula------------	C	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.0: Moist 5.0-7.0: Wet	0.0-0.5: Moist 0.5-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet ---	0.0-1.0: Moist 1.0-2.5: Wet 2.5-4.5: Moist 4.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---	0.0-0.5: Dry 0.5-7.0: Moist --- ---	0.0-7.0: Moist --- --- ---	0.0-2.0: Moist 2.0-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-1.5: Moist 1.5-2.5: Wet 2.5-5.5: Moist 5.5-7.0: Wet	0.0-5.5: Moist 5.5-7.0: Wet --- ---
206B:													
Traunik----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
207D:													
Dishno-----------	C	0.0-3.8: Moist ---	0.0-3.8: Moist ---	0.0-2.0: Moist 2.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-1.5: Moist 1.5-3.8: Wet	0.0-3.8: Moist ---	0.0-1.0: Dry 1.0-3.8: Moist	0.0-1.5: Dry 1.5-3.8: Moist	0.0-3.0: Moist 3.0-3.8: Wet	0.0-1.0: Moist 1.0-3.8: Wet	0.0-2.0: Moist 2.0-3.8: Wet	0.0-3.8: Moist ---
Michigamme-------	C	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---
Rock outcrop.													
208F:													
Keewaydin--------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Michigamme-------	C	0.0-2.4: Moist ---	0.0-7.0: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-1.0: Dry 1.0-2.4: Moist	0.0-1.5: Dry 1.5-2.4: Moist	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---	0.0-2.4: Moist ---

Table 20.--Soil Moisture Status by Depth--Continued

Map symbol and soil name	Hydrologic group	January	February	March	April	May	June	July	August	September	October	November	December
209B:													
Garlic----------	A	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Dry 2.0-7.0: Moist	0.0-3.0: Dry 3.0-7.0: Moist	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-7.0: Moist ---
Fence-----------	B	0.0-7.0: Moist ---	0.0-7.0: Moist ---	0.0-2.0: Moist 2.0-7.0: Wet	0.0-1.5: Moist 1.5-7.0: Wet	0.0-2.0: Moist 2.0-7.0: Wet	0.0-7.0: Moist ---	0.0-1.0: Dry 1.0-7.0: Moist	0.0-1.5: Dry 1.5-7.0: Moist	0.0-7.0: Moist ---	0.0-5.0: Moist 5.0-7.0: Wet	0.0-4.5: Moist 4.5-7.0: Wet	0.0-5.0: Moist 5.0-7.0: Wet
M-W. Miscellaneous water													
W. Water													

Table 21.--Ponding Frequency, Duration, and Depth

(Depths are in feet. See text for an explanation of terms used in this table)

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
10B:												
Grayling--------	None	None	None	None	None	None	None	None	None	None	None	None
10D:												
Grayling--------	None	None	None	None	None	None	None	None	None	None	None	None
10E:												
Grayling--------	None	None	None	None	None	None	None	None	None	None	None	None
11C:												
Deer Park-------	None	None	None	None	None	None	None	None	None	None	None	None
11D:												
Deer Park-------	None	None	None	None	None	None	None	None	None	None	None	None
12B:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
12D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
12E:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
12F:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
13B:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
13D:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
13E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
13F:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
14B:												
Rousseau--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
14D:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
15A:												
Croswell	None	None	None	None	None	None	None	None	None	None	None	None
16A:												
Paquin	None	None	None	None	None	None	None	None	None	None	None	None
17A:												
Au Gres	None	None	None	None	None	None	None	None	None	None	None	None
18:												
Kinross	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
19:												
Deford	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
20B:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
20D:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
20E:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
22B:												
Alcona	None	None	None	None	None	None	None	None	None	None	None	None
24B:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
24D:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
25B:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
25D:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
26A:												
Skanee----------	None	None	None	None	None	None	None	None	None	None	None	None
27:												
Gay-------------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
28B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
28D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
28E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
29B:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
29D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
31D:												
Trenary---------	None	None	None	None	None	None	None	None	None	None	None	None
32A:												
Charlevoix------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
33: Ensley	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
34B: Onaway	None	None	None	None	None	None	None	None	None	None	None	None
34D: Onaway	None	None	None	None	None	None	None	None	None	None	None	None
34E: Onaway	None	None	None	None	None	None	None	None	None	None	None	None
35B: Champion	None	None	None	None	None	None	None	None	None	None	None	None
35D: Champion	None	None	None	None	None	None	None	None	None	None	None	None
36A: Net	None	None	None	None	None	None	None	None	None	None	None	None
37: Witbeck	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
38B: Pence	None	None	None	None	None	None	None	None	None	None	None	None
38D: Pence	None	None	None	None	None	None	None	None	None	None	None	None
38E: Pence	None	None	None	None	None	None	None	None	None	None	None	None
39B: Amasa	None	None	None	None	None	None	None	None	None	None	None	None
39D: Amasa	None	None	None	None	None	None	None	None	None	None	None	None
39E: Amasa	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
40B:												
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
40D:												
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
41A:												
Channing--------	None	None	None	None	None	None	None	None	None	None	None	None
42:												
Minocqua--------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
43B:												
Karlin----------	None	None	None	None	None	None	None	None	None	None	None	None
43D:												
Karlin----------	None	None	None	None	None	None	None	None	None	None	None	None
44B:												
Carlshend-------	None	None	None	None	None	None	None	None	None	None	None	None
45A:												
Zeba------------	None	None	None	None	None	None	None	None	None	None	None	None
46:												
Jacobsville-----	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
48:												
Burt------------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
50A:												
Sundell---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
51:												
Nahma-----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
52B:												
Summerville-----	None	None	None	None	None	None	None	None	None	None	None	None
55F:												
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56D:												
Peshekee--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56E:												
Peshekee--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56F:												
Peshekee--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
57:												
Carbondale------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
Tawas-----------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
58:												
Greenwood-------	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 1.0	Frequent Long Depth: 1.0	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
58:												
Dawson----------	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 1.0	Frequent Long Depth: 1.0	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5
59:												
Chippeny--------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
Nahma-----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
60:												
Histosols-------	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0
Aquents---------	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0	Frequent Very long Depth: 1.0
61. Pits, borrow												
62B:												
Udorthents------	None	None	None	None	None	None	None	None	None	None	None	None
Udipsamments----	None	None	None	None	None	None	None	None	None	None	None	None
64. Pits and Dumps												
65B:												
Udorthents------	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
66B:												
Udipsamments----	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												
67B:												
Urban land.												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
68.												
Pits, quarries												
69B:												
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
69D:												
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
70B:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
70D:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
71B:												
Evart-----------	None	Rare Very brief	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Rare Brief Depth: 0.2	None	None	Rare Very brief	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Pelkie----------	None	None	None	None	None	None	None	None	None	None	None	None
Sturgeon--------	None	None	None	None	None	None	None	None	None	None	None	None
72B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
72D:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
72E:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
73B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
73D:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
74D:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
74F:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
76C:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
76E:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
76F:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
77D:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
77E:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
78C:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
78E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
78F:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
79B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
80B:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
80D:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
80E:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
81B:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
81D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
81E:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
84D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ishpeming-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
84F:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ishpeming-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
85A:												
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None
86B:												
Mashek----------	None	None	None	None	None	None	None	None	None	None	None	None
87B:												
Cunard----------	None	None	None	None	None	None	None	None	None	None	None	None
88:												
Cathro----------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
Ensley----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
89B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
90B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
90D:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
91B:												
Onaway----------	None	None	None	None	None	None	None	None	None	None	None	None
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
92A:												
Ensley----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None
93:												
Tawas-----------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
Deford----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
94B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
94D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
94E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
95B:												
Liminga---------	None	None	None	None	None	None	None	None	None	None	None	None
95D:												
Liminga---------	None	None	None	None	None	None	None	None	None	None	None	None
100E:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
100F:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
103D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc---------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
104C:												
Fence-----------	None	None	None	None	None	None	None	None	None	None	None	None
105C:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
106B:												
Sagola----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
106D:												
Sagola----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
107B:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
107D:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
107F:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
108B:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Wabeno----------	None	None	None	None	None	None	None	None	None	None	None	None
108D:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Wabeno----------	None	None	None	None	None	None	None	None	None	None	None	None
109B:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
109D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
109F:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
110B:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
Mancelona-------	None	None	None	None	None	None	None	None	None	None	None	None
110D:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
Mancelona-------	None	None	None	None	None	None	None	None	None	None	None	None
111B:												
Grayling--------	None	None	None	None	None	None	None	None	None	None	None	None
112D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
112F:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
113B:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
113D:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
113F:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
114B:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
114D:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
114F:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
117B:												
Fence-----------	None	None	None	None	None	None	None	None	None	None	None	None
118A:												
Croswell--------	None	None	None	None	None	None	None	None	None	None	None	None
Deford----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
119B:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
119D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
121B:												
Onota-----------	None	None	None	None	None	None	None	None	None	None	None	None
122:												
Pleine----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
123A:												
Tula------------	None	None	None	None	None	None	None	None	None	None	None	None
124B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
124D:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
125D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
125F:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
126B:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
126D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
126E:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127B:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127F:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
128B:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
128D:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
128E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
129C:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
130A:												
Chabeneau-------	None	None	None	None	None	None	None	None	None	None	None	None
131:												
Witbeck---------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Cathro----------	None	None	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
132. Slickens												
133B:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
133D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
134B:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
134D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
134F:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
135A:												
Witbeck---------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
135A:												
Net	None	None	None	None	None	None	None	None	None	None	None	None
136A:												
Minocqua	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Channing	None	None	None	None	None	None	None	None	None	None	None	None
137D:												
Keewaydin	None	None	None	None	None	None	None	None	None	None	None	None
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
137F:												
Keewaydin	None	None	None	None	None	None	None	None	None	None	None	None
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
138D:												
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
138F:												
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
139B:												
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
139D:												
Sundog	None	None	None	None	None	None	None	None	None	None	None	None
140B:												
Champion	None	None	None	None	None	None	None	None	None	None	None	None
Dishno	None	None	None	None	None	None	None	None	None	None	None	None
140D:												
Champion	None	None	None	None	None	None	None	None	None	None	None	None
Dishno	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
141D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
142B:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
142D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
144B:												
Farquar---------	None	None	None	None	None	None	None	None	None	None	None	None
145C:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
146B:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Skanee----------	None	None	None	None	None	None	None	None	None	None	None	None
147A:												
Skanee----------	None	None	None	None	None	None	None	None	None	None	None	None
Gay-------------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
148B:												
Shoepac---------	None	None	None	None	None	None	None	None	None	None	None	None
Ensley----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
149:												
Evart-----------	None	Rare Very brief	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	Occasional Brief	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
149:												
Cathro	None	Rare Very brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 0.5	Frequent Long Depth: 0.5	Frequent Brief Depth: 0.5	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	None
150:												
Shag	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
151A:												
Spear	None	None	None	None	None	None	None	None	None	None	None	None
153D:												
Ishpeming	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
153F:												
Ishpeming	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
154B:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
Sayner	None	None	None	None	None	None	None	None	None	None	None	None
154D:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
Sayner	None	None	None	None	None	None	None	None	None	None	None	None
155A:												
Zeba	None	None	None	None	None	None	None	None	None	None	None	None
Jacobsville	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
156B:												
Duel	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
157B:												
Reade	None	None	None	None	None	None	None	None	None	None	None	None
Nahma	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
158C:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
Onota	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer	None	None	None	None	None	None	None	None	None	None	None	None
159A:												
Jeske	None	None	None	None	None	None	None	None	None	None	None	None
160B:												
Paquin	None	None	None	None	None	None	None	None	None	None	None	None
Finch	None	None	None	None	None	None	None	None	None	None	None	None
161B:												
Yellowdog	None	None	None	None	None	None	None	None	None	None	None	None
162B:												
Buckroe	None	None	None	None	None	None	None	None	None	None	None	None
165B:												
Chocolay	None	None	None	None	None	None	None	None	None	None	None	None
Waiska	None	None	None	None	None	None	None	None	None	None	None	None
166:												
Skandia	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 1.0	Frequent Long Depth: 1.0	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5
167:												
Skandia	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 1.0	Frequent Long Depth: 1.0	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
167:												
Jacobsville-----	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
168B:												
Yellowdog-------	None	None	None	None	None	None	None	None	None	None	None	None
Burt------------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
170B:												
Chocolay--------	None	None	None	None	None	None	None	None	None	None	None	None
171B:												
Paavola---------	None	None	None	None	None	None	None	None	None	None	None	None
172D:												
Buckroe---------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
172F:												
Buckroe---------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
173B:												
Pence-----------	None	None	None	None	None	None	None	None	None	None	None	None
173D:												
Pence-----------	None	None	None	None	None	None	None	None	None	None	None	None
174D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
175E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
175F:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
176B:												
Greenwood-------	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Long Depth: 1.0	Frequent Long Depth: 1.0	Frequent Brief Depth: 0.5	None	None	None	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5	Frequent Brief Depth: 0.5
Croswell--------	None	None	None	None	None	None	None	None	None	None	None	None
177E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
177F:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
178D:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
178F:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
179E:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
180E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
180F:												
Kalkaska	None	None	None	None	None	None	None	None	None	None	None	None
Frohling	None	None	None	None	None	None	None	None	None	None	None	None
181E:												
Frohling	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok	None	None	None	None	None	None	None	None	None	None	None	None
181F:												
Frohling	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok	None	None	None	None	None	None	None	None	None	None	None	None
184C:												
Dishno	None	None	None	None	None	None	None	None	None	None	None	None
Witbeck	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Rock outcrop.												
185B:												
Northland	None	None	None	None	None	None	None	None	None	None	None	None
187B:												
Reade	None	None	None	None	None	None	None	None	None	None	None	None
190B:												
Emmet	None	None	None	None	None	None	None	None	None	None	None	None
Cunard	None	None	None	None	None	None	None	None	None	None	None	None
191B:												
Nahma	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
Sundell	None	None	None	None	None	None	None	None	None	None	None	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
193E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None
194E:												
Sporley---------	None	None	None	None	None	None	None	None	None	None	None	None
196E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Onota-----------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None
197B:												
Shoepac---------	None	None	None	None	None	None	None	None	None	None	None	None
Trenary---------	None	None	None	None	None	None	None	None	None	None	None	None
198B:												
Shoepac---------	None	None	None	None	None	None	None	None	None	None	None	None
Reade-----------	None	None	None	None	None	None	None	None	None	None	None	None
199.												
Udorthents, ash												
200A:												
Charlevoix------	None	None	None	None	None	None	None	None	None	None	None	None
Ensley----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Occasional Brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
201B:												
Sauxhead--------	None	None	None	None	None	None	None	None	None	None	None	None
Jacobsville-----	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None

Table 21.--Ponding Frequency, Duration, and Depth--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
202B:												
Sauxhead--------	None	None	None	None	None	None	None	None	None	None	None	None
203A:												
Au Gres---------	None	None	None	None	None	None	None	None	None	None	None	None
Deford----------	None	None	Occasional Brief Depth: 0.2	Frequent Long Depth: 0.2	Frequent Long Depth: 0.2	Rare Very brief Depth: 0.2	None	None	None	Frequent Brief Depth: 0.2	Frequent Brief Depth: 0.2	None
204B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Tula------------	None	None	None	None	None	None	None	None	None	None	None	None
206B:												
Traunik---------	None	None	None	None	None	None	None	None	None	None	None	None
207D:												
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
208F:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
209B:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Fence-----------	None	None	None	None	None	None	None	None	None	None	None	None
M-W. Miscellaneous water												
W. Water												

Table 22.--Flooding Frequency and Duration

(See text for definitions of terms used in this table)

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
10B:												
Grayling	None	None	None	None	None	None	None	None	None	None	None	None
10D:												
Grayling	None	None	None	None	None	None	None	None	None	None	None	None
10E:												
Grayling	None	None	None	None	None	None	None	None	None	None	None	None
11C:												
Deer Park	None	None	None	None	None	None	None	None	None	None	None	None
11D:												
Deer Park	None	None	None	None	None	None	None	None	None	None	None	None
12B:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
12D:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
12E:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
12F:												
Rubicon	None	None	None	None	None	None	None	None	None	None	None	None
13B:												
Kalkaska	None	None	None	None	None	None	None	None	None	None	None	None
13D:												
Kalkaska	None	None	None	None	None	None	None	None	None	None	None	None
13E:												
Kalkaska	None	None	None	None	None	None	None	None	None	None	None	None
13F:												
Kalkaska	None	None	None	None	None	None	None	None	None	None	None	None
14B:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
14D:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
15A:												
Croswell	None	None	None	None	None	None	None	None	None	None	None	None
16A:												
Paquin	None	None	None	None	None	None	None	None	None	None	None	None
17A:												
Au Gres	None	None	None	None	None	None	None	None	None	None	None	None
18:												
Kinross	None	None	None	None	None	None	None	None	None	None	None	None
19:												
Deford	None	None	None	None	None	None	None	None	None	None	None	None
20B:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
20D:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
20E:												
Rousseau	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc	None	None	None	None	None	None	None	None	None	None	None	None
22B:												
Alcona	None	None	None	None	None	None	None	None	None	None	None	None
24B:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
24D:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
25B:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
25D:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
26A:												
Skanee----------	None	None	None	None	None	None	None	None	None	None	None	None
27:												
Gay-------------	None	None	None	None	None	None	None	None	None	None	None	None
28B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
28D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
28E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
29B:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
29D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
31D:												
Trenary---------	None	None	None	None	None	None	None	None	None	None	None	None
32A:												
Charlevoix------	None	None	None	None	None	None	None	None	None	None	None	None
33:												
Ensley----------	None	None	None	None	None	None	None	None	None	None	None	None
34B:												
Onaway----------	None	None	None	None	None	None	None	None	None	None	None	None
34D:												
Onaway----------	None	None	None	None	None	None	None	None	None	None	None	None
34E:												
Onaway----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
35B:												
Champion--------	None	None	None	None	None	None	None	None	None	None	None	None
35D:												
Champion--------	None	None	None	None	None	None	None	None	None	None	None	None
36A:												
Net-------------	None	None	None	None	None	None	None	None	None	None	None	None
37:												
Witbeck---------	None	None	None	None	None	None	None	None	None	None	None	None
38B:												
Pence-----------	None	None	None	None	None	None	None	None	None	None	None	None
38D:												
Pence-----------	None	None	None	None	None	None	None	None	None	None	None	None
38E:												
Pence-----------	None	None	None	None	None	None	None	None	None	None	None	None
39B:												
Amasa-----------	None	None	None	None	None	None	None	None	None	None	None	None
39D:												
Amasa-----------	None	None	None	None	None	None	None	None	None	None	None	None
39E:												
Amasa-----------	None	None	None	None	None	None	None	None	None	None	None	None
40B:												
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
40D:												
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
41A:												
Channing--------	None	None	None	None	None	None	None	None	None	None	None	None
42:												
Minocqua--------	None	None	None	None	None	None	None	None	None	None	None	None
43B:												
Karlin----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
43D:												
Karlin	None	None	None	None	None	None	None	None	None	None	None	None
44B:												
Carlshend	None	None	None	None	None	None	None	None	None	None	None	None
45A:												
Zeba	None	None	None	None	None	None	None	None	None	None	None	None
46:												
Jacobsville	None	None	None	None	None	None	None	None	None	None	None	None
48:												
Burt	None	None	None	None	None	None	None	None	None	None	None	None
50A:												
Sundell	None	None	None	None	None	None	None	None	None	None	None	None
51:												
Nahma	None	None	None	None	None	None	None	None	None	None	None	None
52B:												
Summerville	None	None	None	None	None	None	None	None	None	None	None	None
55F:												
Michigamme	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56D:												
Peshekee	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56E:												
Peshekee	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
56F:												
Peshekee	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
57:												
Carbondale------	None	None	None	None	None	None	None	None	None	None	None	None
Tawas-----------	None	None	None	None	None	None	None	None	None	None	None	None
58:												
Greenwood-------	None	None	None	None	None	None	None	None	None	None	None	None
Dawson----------	None	None	None	None	None	None	None	None	None	None	None	None
59:												
Chippeny--------	None	None	None	None	None	None	None	None	None	None	None	None
Nahma-----------	None	None	None	None	None	None	None	None	None	None	None	None
60:												
Histosols-------	None	None	None	None	None	None	None	None	None	None	None	None
Aquents---------	None	None	None	None	None	None	None	None	None	None	None	None
61.												
Pits, borrow												
62B:												
Udorthents------	None	None	None	None	None	None	None	None	None	None	None	None
Udipsamments----	None	None	None	None	None	None	None	None	None	None	None	None
64.												
Pits and Dumps												
65B:												
Udorthents------	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												
66B:												
Udipsamments----	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												
67B:												
Urban land.												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
68:												
Pits, quarries--	None	None	None	None	None	None	None	None	None	None	None	None
69B:												
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
69D:												
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
70B:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
70D:												
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
71B:												
Evart-----------	None	Rare Very brief	Occasional Brief	Frequent Long	Frequent Long	Occasional Brief	None	None	Occasional Brief	Occasional Brief	Rare Very brief	None
Pelkie----------	None	None	Occasional Brief	Occasional Brief	Occasional Brief	None	None	None	None	None	None	None
Sturgeon--------	None	None	Occasional Brief	Occasional Brief	Occasional Brief	None	None	None	None	None	None	None
72B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
72D:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
72E:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
73B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
73D:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
74D:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
74F:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
76C:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
76E:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
76F:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
77D:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
77E:												
Garlic----------	None	None	None	None	None	None	None	None	None	None	None	None
Alcona----------	None	None	None	None	None	None	None	None	None	None	None	None
Voelker---------	None	None	None	None	None	None	None	None	None	None	None	None
78C:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
78E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
78F:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
79B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
80B:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
80D:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
80E:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
81B:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
81D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
81E:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
84D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ishpeming-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
84F:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ishpeming-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
85A:												
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None
86B:												
Mashek----------	None	None	None	None	None	None	None	None	None	None	None	None
87B:												
Cunard----------	None	None	None	None	None	None	None	None	None	None	None	None
88:												
Cathro----------	None	None	None	None	None	None	None	None	None	None	None	None
Ensley----------	None	None	None	None	None	None	None	None	None	None	None	None
89B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None
90B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
90D:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Escanaba--------	None	None	None	None	None	None	None	None	None	None	None	None
91B:												
Onaway----------	None	None	None	None	None	None	None	None	None	None	None	None
Nadeau----------	None	None	None	None	None	None	None	None	None	None	None	None
92A:												
Ensley----------	None	None	None	None	None	None	None	None	None	None	None	None
Solona----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
93:												
Tawas-----------	None	None	None	None	None	None	None	None	None	None	None	None
Deford----------	None	None	None	None	None	None	None	None	None	None	None	None
94B:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
94D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
94E:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
95B:												
Liminga---------	None	None	None	None	None	None	None	None	None	None	None	None
95D:												
Liminga---------	None	None	None	None	None	None	None	None	None	None	None	None
100E:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
100F:												
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
103D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Ocqueoc---------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
104C:												
Fence-----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
105C:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
106B:												
Sagola----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
106D:												
Sagola----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
107B:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
107D:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
107F:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
108B:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Wabeno----------	None	None	None	None	None	None	None	None	None	None	None	None
108D:												
Goodman---------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Wabeno----------	None	None	None	None	None	None	None	None	None	None	None	None
109B:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
109D:												
Rubicon----------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw---------	None	None	None	None	None	None	None	None	None	None	None	None
109F:												
Rubicon----------	None	None	None	None	None	None	None	None	None	None	None	None
Keweenaw---------	None	None	None	None	None	None	None	None	None	None	None	None
110B:												
Nadeau-----------	None	None	None	None	None	None	None	None	None	None	None	None
Mancelona--------	None	None	None	None	None	None	None	None	None	None	None	None
110D:												
Nadeau-----------	None	None	None	None	None	None	None	None	None	None	None	None
Mancelona--------	None	None	None	None	None	None	None	None	None	None	None	None
111B:												
Grayling---------	None	None	None	None	None	None	None	None	None	None	None	None
112D:												
Keewaydin--------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
112F:												
Keewaydin--------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
113B:												
Vanriper---------	None	None	None	None	None	None	None	None	None	None	None	None
113D:												
Vanriper---------	None	None	None	None	None	None	None	None	None	None	None	None
113F:												
Vanriper---------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
114B:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
114D:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
114F:												
Vanriper--------	None	None	None	None	None	None	None	None	None	None	None	None
117B:												
Fence-----------	None	None	None	None	None	None	None	None	None	None	None	None
118A:												
Croswell--------	None	None	None	None	None	None	None	None	None	None	None	None
Deford----------	None	None	None	None	None	None	None	None	None	None	None	None
119B:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
119D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
121B:												
Onota-----------	None	None	None	None	None	None	None	None	None	None	None	None
122:												
Pleine----------	None	None	None	None	None	None	None	None	None	None	None	None
123A:												
Tula------------	None	None	None	None	None	None	None	None	None	None	None	None
124B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
124D:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
125D:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
125F:												
Keweenaw--------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
126B:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
126D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
126E:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127B:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
127F:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
128B:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
128D:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
128E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
129C:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
130A:												
Chabeneau-------	None	None	None	None	None	None	None	None	None	None	None	None
131:												
Witbeck---------	None	None	None	None	None	None	None	None	None	None	None	None
Cathro----------	None	None	None	None	None	None	None	None	None	None	None	None
132.												
Slickens												
133B:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
133D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
134B:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
134D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
134F:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
135A:												
Witbeck---------	None	None	None	None	None	None	None	None	None	None	None	None
Net-------------	None	None	None	None	None	None	None	None	None	None	None	None
136A:												
Minocqua--------	None	None	None	None	None	None	None	None	None	None	None	None
Channing--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
137D:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
137F:												
Keewaydin-------	None	None	None	None	None	None	None	None	None	None	None	None
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
138D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
138F:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
139B:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
139D:												
Sundog----------	None	None	None	None	None	None	None	None	None	None	None	None
140B:												
Champion--------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
140D:												
Champion--------	None	None	None	None	None	None	None	None	None	None	None	None
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
141D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
142B:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None
142D:												
Pelissier-------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
144B:												
Farquar	None	None	None	None	None	None	None	None	None	None	None	None
145C:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer	None	None	None	None	None	None	None	None	None	None	None	None
146B:												
Munising	None	None	None	None	None	None	None	None	None	None	None	None
Skanee	None	None	None	None	None	None	None	None	None	None	None	None
147A:												
Skanee	None	None	None	None	None	None	None	None	None	None	None	None
Gay	None	None	None	None	None	None	None	None	None	None	None	None
148B:												
Shoepac	None	None	None	None	None	None	None	None	None	None	None	None
Ensley	None	None	None	None	None	None	None	None	None	None	None	None
149:												
Evart	None	Rare Very brief	Occasional Brief	Frequent Long	Frequent Long	Occasional Brief	None	None	Occasional Brief	Occasional Brief	Rare Very brief	None
Cathro	None	Rare Very brief	Occasional Brief	Frequent Long	Frequent Long	Occasional Brief	None	None	Occasional Brief	Occasional Brief	Rare Very brief	None
150:												
Shag	None	None	None	None	None	None	None	None	None	None	None	None
151A:												
Spear	None	None	None	None	None	None	None	None	None	None	None	None
153D:												
Ishpeming	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
153F:												
Ishpeming-------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
154B:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
154D:												
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Sayner----------	None	None	None	None	None	None	None	None	None	None	None	None
155A:												
Zeba------------	None	None	None	None	None	None	None	None	None	None	None	None
Jacobsville-----	None	None	None	None	None	None	None	None	None	None	None	None
156B:												
Duel------------	None	None	None	None	None	None	None	None	None	None	None	None
157B:												
Reade-----------	None	None	None	None	None	None	None	None	None	None	None	None
Nahma-----------	None	None	None	None	None	None	None	None	None	None	None	None
158C:												
Munising--------	None	None	None	None	None	None	None	None	None	None	None	None
Onota-----------	None	None	None	None	None	None	None	None	None	None	None	None
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
159A:												
Jeske-----------	None	None	None	None	None	None	None	None	None	None	None	None
160B:												
Paquin----------	None	None	None	None	None	None	None	None	None	None	None	None
Finch-----------	None	None	None	None	None	None	None	None	None	None	None	None
161B:												
Yellowdog-------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
162B:												
Buckroe----------	None	None	None	None	None	None	None	None	None	None	None	None
165B:												
Chocolay---------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska-----------	None	None	None	None	None	None	None	None	None	None	None	None
166:												
Skandia----------	None	None	None	None	None	None	None	None	None	None	None	None
167:												
Skandia----------	None	None	None	None	None	None	None	None	None	None	None	None
Jacobsville------	None	None	None	None	None	None	None	None	None	None	None	None
168B:												
Yellowdog--------	None	None	None	None	None	None	None	None	None	None	None	None
Burt-------------	None	None	None	None	None	None	None	None	None	None	None	None
170B:												
Chocolay---------	None	None	None	None	None	None	None	None	None	None	None	None
171B:												
Paavola----------	None	None	None	None	None	None	None	None	None	None	None	None
172D:												
Buckroe----------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
172F:												
Buckroe----------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
173B:												
Pence------------	None	None	None	None	None	None	None	None	None	None	None	None
173D:												
Pence------------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
174D:												
Yalmer----------	None	None	None	None	None	None	None	None	None	None	None	None
Rubicon---------	None	None	None	None	None	None	None	None	None	None	None	None
Urban land.												
175E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
175F:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Waiska----------	None	None	None	None	None	None	None	None	None	None	None	None
176B:												
Greenwood-------	None	None	None	None	None	None	None	None	None	None	None	None
Croswell--------	None	None	None	None	None	None	None	None	None	None	None	None
177E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
177F:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
178D:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
178F:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
179E:												
Schweitzer------	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
180E:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
180F:												
Kalkaska--------	None	None	None	None	None	None	None	None	None	None	None	None
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
181E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None
181F:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None
184C:												
Dishno----------	None	None	None	None	None	None	None	None	None	None	None	None
Witbeck---------	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
185B:												
Northland-------	None	None	None	None	None	None	None	None	None	None	None	None
187B:												
Reade-----------	None	None	None	None	None	None	None	None	None	None	None	None
190B:												
Emmet-----------	None	None	None	None	None	None	None	None	None	None	None	None
Cunard----------	None	None	None	None	None	None	None	None	None	None	None	None
191B:												
Nahma-----------	None	None	None	None	None	None	None	None	None	None	None	None
Sundell---------	None	None	None	None	None	None	None	None	None	None	None	None
193E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
194E:												
Sporley---------	None	None	None	None	None	None	None	None	None	None	None	None
196E:												
Frohling--------	None	None	None	None	None	None	None	None	None	None	None	None
Onota-----------	None	None	None	None	None	None	None	None	None	None	None	None
Tokiahok--------	None	None	None	None	None	None	None	None	None	None	None	None
197B:												
Shoepac---------	None	None	None	None	None	None	None	None	None	None	None	None
Trenary---------	None	None	None	None	None	None	None	None	None	None	None	None
198B:												
Shoepac---------	None	None	None	None	None	None	None	None	None	None	None	None
Reade-----------	None	None	None	None	None	None	None	None	None	None	None	None
199.												
Udorthents, ash												
200A:												
Charlevoix------	None	None	None	None	None	None	None	None	None	None	None	None
Ensley----------	None	None	None	None	None	None	None	None	None	None	None	None
201B:												
Sauxhead--------	None	None	None	None	None	None	None	None	None	None	None	None
Jacobsville-----	None	None	None	None	None	None	None	None	None	None	None	None
202B:												
Sauxhead--------	None	None	None	None	None	None	None	None	None	None	None	None
203A:												
Au Gres---------	None	None	None	None	None	None	None	None	None	None	None	None
Deford----------	None	None	None	None	None	None	None	None	None	None	None	None
204B:												
Gogebic---------	None	None	None	None	None	None	None	None	None	None	None	None
Tula------------	None	None	None	None	None	None	None	None	None	None	None	None

Table 22.--Flooding Frequency and Duration--Continued

Map symbol and soil name	January	February	March	April	May	June	July	August	September	October	November	December
206B:												
Traunik	None	None	None	None	None	None	None	None	None	None	None	None
207D:												
Dishno	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme	None	None	None	None	None	None	None	None	None	None	None	None
Rock outcrop.												
208F:												
Keewaydin	None	None	None	None	None	None	None	None	None	None	None	None
Michigamme	None	None	None	None	None	None	None	None	None	None	None	None
209B:												
Garlic	None	None	None	None	None	None	None	None	None	None	None	None
Fence	None	None	None	None	None	None	None	None	None	None	None	None
M-W. Miscellaneous water												
W. Water												

Table 23.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
10B:							
Grayling	---	---	---	---	Low	Low	Moderate
10D:							
Grayling	---	---	---	---	Low	Low	Moderate
10E:							
Grayling	---	---	---	---	Low	Low	Moderate
11C:							
Deer Park	---	---	---	---	Low	Low	Low
11D:							
Deer Park	---	---	---	---	Low	Low	Low
12B:							
Rubicon	---	---	---	---	Low	Low	High
12D:							
Rubicon	---	---	---	---	Low	Low	High
12E:							
Rubicon	---	---	---	---	Low	Low	High
12F:							
Rubicon	---	---	---	---	Low	Low	High
13B:							
Kalkaska	---	---	---	---	Low	Low	High
13D:							
Kalkaska	---	---	---	---	Low	Low	High
13E:							
Kalkaska	---	---	---	---	Low	Low	High
13F:							
Kalkaska	---	---	---	---	Low	Low	High
14B:							
Rousseau	---	---	---	---	Low	Low	Moderate
14D:							
Rousseau	---	---	---	---	Low	Low	Moderate
15A:							
Croswell	---	---	---	---	Low	Low	Moderate
16A:							
Paquin	Ortstein	10-16	1-10	Strongly cemented	Low	Low	High
17A:							
Au Gres	---	---	---	---	Moderate	Low	Moderate
18:							
Kinross	---	---	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
19:							
Deford	---	---	---	---	Moderate	Low	Moderate
20B:							
Rousseau	---	---	---	---	Low	Low	Moderate
Ocqueoc	---	---	---	---	Low	Low	Moderate
20D:							
Rousseau	---	---	---	---	Low	Low	Moderate
Ocqueoc	---	---	---	---	Low	Low	Moderate
20E:							
Rousseau	---	---	---	---	Low	Low	Moderate
Ocqueoc	---	---	---	---	Low	Low	Moderate
22B:							
Alcona	---	---	---	---	Moderate	Low	Low
24B:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
24D:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
25B:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
25D:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
26A:							
Skanee	Fragipan	12-20	15-30	Strongly cemented	High	Moderate	High
27:							
Gay	---	---	---	---	High	High	Moderate
28B:							
Keweenaw	---	---	---	---	Low	Low	Moderate
28D:							
Keweenaw	---	---	---	---	Low	Low	Moderate
28E:							
Keweenaw	---	---	---	---	Low	Low	Moderate
29B:							
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
29D:							
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
31D:							
Trenary	---	---	---	---	Moderate	Low	Moderate
32A:							
Charlevoix	---	---	---	---	High	Moderate	Moderate
33:							
Ensley	---	---	---	---	High	High	Low
34B:							
Onaway	---	---	---	---	Moderate	Low	Moderate
34D:							
Onaway	---	---	---	---	Moderate	Low	Moderate
34E:							
Onaway	---	---	---	---	Moderate	Low	Moderate
35B:							
Champion	Fragipan	18-24	15-40	Strongly cemented	Moderate	Moderate	High
35D:							
Champion	Fragipan	18-24	15-40	Strongly cemented	Moderate	Moderate	High
36A:							
Net	Fragipan	15-25	15-35	Strongly cemented	High	Moderate	Moderate
37:							
Witbeck	---	---	---	---	High	High	Moderate
38B:							
Pence	---	---	---	---	Low	Low	Moderate
38D:							
Pence	---	---	---	---	Low	Low	Moderate
38E:							
Pence	---	---	---	---	Low	Low	Moderate
39B:							
Amasa	---	---	---	---	Moderate	Low	Moderate
39D:							
Amasa	---	---	---	---	Moderate	Low	Moderate
39E:							
Amasa	---	---	---	---	Moderate	Low	Moderate
40B:							
Waiska	---	---	---	---	Low	Low	Moderate
40D:							
Waiska	---	---	---	---	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
41A:							
Channing	---	---	---	---	High	Moderate	Moderate
42:							
Minocqua	---	---	---	---	High	High	High
43B:							
Karlin	---	---	---	---	Low	Low	High
43D:							
Karlin	---	---	---	---	Low	Low	High
44B:							
Carlshend	Bedrock (paralithic)	10-20	10-25	Strongly cemented	Moderate	Low	Moderate
	Bedrock (lithic)	20-35	---	Indurated			
45A:							
Zeba	Bedrock (lithic)	20-40	---	Indurated	High	Moderate	Moderate
	Bedrock (paralithic)	20-35	0-5	Moderately cemented			
46:							
Jacobsville	Bedrock (lithic)	20-40	---	Indurated	High	High	High
48:							
Burt	Bedrock (lithic)	10-20	---	Indurated	Moderate	High	High
50A:							
Sundell	Bedrock (lithic)	20-40	---	Indurated	High	Moderate	Low
51:							
Nahma	Bedrock (lithic)	20-40	---	Indurated	High	High	Low
52B:							
Summerville	Bedrock (lithic)	10-20	---	Indurated	Moderate	Low	Low
55F:							
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
56D:							
Peshekee	Bedrock (lithic)	10-20	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
56E:							
Peshekee	Bedrock (lithic)	10-20	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
56F:							
Peshekee	Bedrock (lithic)	10-20	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
57:							
Carbondale	---	---	---	---	High	High	Moderate
Tawas	---	---	---	---	High	High	Moderate
58:							
Greenwood	---	---	---	---	High	High	High
Dawson	---	---	---	---	High	High	High
59:							
Chippeny	Bedrock (lithic)	20-51	---	Indurated	High	High	Moderate
Nahma	Bedrock (lithic)	20-40	---	Indurated	High	High	Low
60:							
Histosols	---	---	---	---	High	High	Moderate
Aquents	---	---	---	---	High	---	---
61.							
Pits, borrow							
62B:							
Udorthents.							
Udipsamments	---	---	---	---	Low	Low	Moderate
64.							
Pits and Dumps							
65B.							
Udorthents-Urban land							
66B:							
Udipsamments	---	---	---	---	Low	Low	Moderate
Urban land.							
67B:							
Urban land.							
Rubicon	---	---	---	---	Low	Low	High
68:							
Pits, quarries	Bedrock (lithic)	0-4	---	Indurated	---	---	---
69B:							
Escanaba	---	---	---	---	Moderate	Low	Low
69D:							
Escanaba	---	---	---	---	Moderate	Low	Low
70B:							
Nadeau	---	---	---	---	Moderate	Low	Low
70D:							
Nadeau	---	---	---	---	Moderate	Low	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
71B:							
Evart	---	---	---	---	Moderate	High	Low
Pelkie	---	---	---	---	Low	Low	Moderate
Sturgeon	---	---	---	---	High	Moderate	Moderate
72B:							
Emmet	---	---	---	---	Moderate	Low	Moderate
72D:							
Emmet	---	---	---	---	Moderate	Low	Moderate
72E:							
Emmet	---	---	---	---	Moderate	Low	Moderate
73B:							
Gogebic	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
73D:							
Gogebic	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
74D:							
Schweitzer	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop.							
74F:							
Schweitzer	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop.							
76C:							
Garlic	---	---	---	---	Low	Low	High
Alcona	---	---	---	---	Moderate	Low	Low
Voelker	Ortstein	6-12	10-20	Strongly cemented	Low	Low	Moderate
76E:							
Garlic	---	---	---	---	Low	Low	High
Alcona	---	---	---	---	Moderate	Low	Low
Voelker	Ortstein	6-12	10-20	Strongly cemented	Low	Low	Moderate
76F:							
Garlic	---	---	---	---	Low	Low	High
Alcona	---	---	---	---	Moderate	Low	Low
Voelker	Ortstein	6-12	10-20	Strongly cemented	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
77D:							
Garlic	---	---	---	---	Low	Low	High
Alcona	---	---	---	---	Moderate	Low	Low
Voelker	Ortstein	6-12	10-20	Strongly cemented	Low	Low	Moderate
77E:							
Garlic	---	---	---	---	Low	Low	High
Alcona	---	---	---	---	Moderate	Low	Low
Voelker	Ortstein	6-12	10-20	Strongly cemented	Low	Low	Moderate
78C:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
78E:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
78F:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
79B:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
80B:							
Sayner	---	---	---	---	Low	Low	Moderate
Rubicon	---	---	---	---	Low	Low	High
80D:							
Sayner	---	---	---	---	Low	Low	Moderate
Rubicon	---	---	---	---	Low	Low	High
80E:							
Sayner	---	---	---	---	Low	Low	Moderate
Rubicon	---	---	---	---	Low	Low	High
81B:							
Pelissier	---	---	---	---	Low	Low	Moderate
81D:							
Pelissier	---	---	---	---	Low	Low	Moderate
81E:							
Pelissier	---	---	---	---	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
84D:							
Rubicon	---	---	---	---	Low	Low	High
Ishpeming	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High
Rock outcrop.							
84F:							
Rubicon	---	---	---	---	Low	Low	High
Ishpeming	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High
Rock outcrop.							
85A:							
Solona	---	---	---	---	High	High	Low
86B:							
Mashek	Dense material	30-50	30-50	Strongly cemented	Moderate	Low	Low
87B:							
Cunard	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	Low
88:							
Cathro	---	---	---	---	High	High	Low
Ensley	---	---	---	---	High	High	Low
89B:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Solona	---	---	---	---	High	High	Low
90B:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Escanaba	---	---	---	---	Moderate	Low	Low
90D:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Escanaba	---	---	---	---	Moderate	Low	Low
91B:							
Onaway	---	---	---	---	Moderate	Low	Moderate
Nadeau	---	---	---	---	Moderate	Low	Low
92A:							
Ensley	---	---	---	---	High	High	Low
Solona	---	---	---	---	High	High	Low
93:							
Tawas	---	---	---	---	High	High	Moderate
Deford	---	---	---	---	Moderate	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
94B:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
94D:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
94E:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
95B:							
Liminga	---	---	---	---	Low	Low	Moderate
95D:							
Liminga	---	---	---	---	Low	Low	Moderate
100E:							
Sayner	---	---	---	---	Low	Low	Moderate
Rubicon	---	---	---	---	Low	Low	High
100F:							
Sayner	---	---	---	---	Low	Low	Moderate
Rubicon	---	---	---	---	Low	Low	High
103D:							
Rubicon	---	---	---	---	Low	Low	High
Ocqueoc	---	---	---	---	Low	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
104C:							
Fence	---	---	---	---	High	Low	High
105C:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
106B:							
Sagola	---	---	---	---	Moderate	Low	Low
Rubicon	---	---	---	---	Low	Low	High
106D:							
Sagola	---	---	---	---	Moderate	Low	Low
Rubicon	---	---	---	---	Low	Low	High
107B:							
Goodman	---	---	---	---	Moderate	Low	High
Sundog	---	---	---	---	Moderate	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Depth to top	Thickness	Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Concrete
		In	In				
107D:							
Goodman----------------	---	---	---	---	Moderate	Low	High
Sundog-----------------	---	---	---	---	Moderate	Low	Moderate
107F:							
Goodman----------------	---	---	---	---	Moderate	Low	High
Sundog-----------------	---	---	---	---	Moderate	Low	Moderate
108B:							
Goodman----------------	---	---	---	---	Moderate	Low	High
Sundog-----------------	---	---	---	---	Moderate	Low	Moderate
Wabeno-----------------	Fragipan	20-32	20-45	Strongly cemented	Moderate	Moderate	High
108D:							
Goodman----------------	---	80-80	---	---	Moderate	Low	High
Sundog-----------------	---	---	---	---	Moderate	Low	Moderate
Wabeno-----------------	Fragipan	20-32	20-45	Strongly cemented	Moderate	Moderate	High
109B:							
Rubicon----------------	---	---	---	---	Low	Low	High
Keweenaw---------------	---	---	---	---	Low	Low	Moderate
109D:							
Rubicon----------------	---	---	---	---	Low	Low	High
Keweenaw---------------	---	---	---	---	Low	Low	Moderate
109F:							
Rubicon----------------	---	---	---	---	Low	Low	High
Keweenaw---------------	---	---	---	---	Low	Low	Moderate
110B:							
Nadeau-----------------	---	---	---	---	Moderate	Low	Low
Mancelona--------------	---	---	---	---	Low	Low	Low
110D:							
Nadeau-----------------	---	---	---	---	Moderate	Low	Low
Mancelona--------------	---	---	---	---	Low	Low	Low
111B:							
Grayling---------------	---	---	---	---	Low	Low	Moderate
112D:							
Keewaydin--------------	---	---	---	---	Low	Low	Moderate
Michigamme-------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop-----------	Bedrock (lithic)	0-4	---	Indurated	None	---	---

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Depth to top (In)	Thickness (In)	Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
112F:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
113B:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
113D:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
113F:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
114B:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
114D:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
114F:							
Vanriper	---	---	---	---	Moderate	Low	Moderate
117B:							
Fence	---	---	---	---	High	Low	High
118A:							
Croswell	---	---	---	---	Low	Low	Moderate
Deford	---	---	---	---	Moderate	Low	Moderate
119B:							
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
119D:							
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
121B:							
Onota	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	Moderate
122:							
Pleine	---	---	---	---	High	High	Moderate
123A:							
Tula	Fragipan	15-30	15-40	Strongly cemented	High	High	Moderate
124B:							
Gogebic	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Depth to top	Thickness	Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Concrete
		In	In				
124D:							
Gogebic	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
125D:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
125F:							
Keweenaw	---	---	---	---	Low	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
126B:							
Sundog	---	---	---	---	Moderate	Low	Moderate
126D:							
Sundog	---	---	---	---	Moderate	Low	Moderate
126E:							
Sundog	---	---	---	---	Moderate	Low	Moderate
127B:							
Sundog	---	---	---	---	Moderate	Low	Moderate
127D:							
Sundog	---	---	---	---	Moderate	Low	Moderate
127F:							
Sundog	---	---	---	---	Moderate	Low	Moderate
128B:							
Kalkaska	---	---	---	---	Low	Low	High
Waiska	---	---	---	---	Low	Low	Moderate
128D:							
Kalkaska	---	---	---	---	Low	Low	High
Waiska	---	---	---	---	Low	Low	Moderate
128E:							
Kalkaska	---	---	---	---	Low	Low	High
Waiska	---	---	---	---	Low	Low	Moderate
129C:							
Kalkaska	---	---	---	---	Low	Low	High
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
130A:							
Chabeneau	---	---	---	---	Moderate	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Depth to top	Thickness	Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Concrete
		In	In				
131:							
Witbeck	---	---	---	---	High	High	Moderate
Cathro	---	---	---	---	High	High	Low
132. Slickens							
133B:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
133D:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
134B:							
Keewaydin	---	---	---	---	Low	Low	Moderate
134D:							
Keewaydin	---	---	---	---	Low	Low	Moderate
134F:							
Keewaydin	---	---	---	---	Low	Low	Moderate
135A:							
Witbeck	---	---	---	---	High	High	Moderate
Net	Fragipan	15-25	15-35	Strongly cemented	High	Moderate	Moderate
136A:							
Minocqua	---	---	---	---	High	High	High
Channing	---	---	---	---	High	Moderate	Moderate
137D:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Sundog	---	---	---	---	Moderate	Low	Moderate
137F:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Sundog	---	---	---	---	Moderate	Low	Moderate
138D:							
Sundog	---	---	---	---	Moderate	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
138F:							
Sundog	---	---	---	---	Moderate	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
139B:							
Sundog	---	---	---	---	Moderate	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
139D:							
Sundog	---	---	---	---	Moderate	Low	Moderate
140B:							
Champion	Fragipan	18-24	15-40	Strongly cemented	Moderate	Moderate	High
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
140D:							
Champion	Fragipan	18-24	15-40	Strongly cemented	Moderate	Moderate	High
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
141D:							
Pelissier	---	---	---	---	Low	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-4	---	---	None	---	---
142B:							
Pelissier	---	---	---	---	Low	Low	Moderate
142D:							
Pelissier	---	---	---	---	Low	Low	Moderate
144B:							
Farquar	---	---	---	---	Low	Low	Moderate
145C:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
Yalmer	Fragipan	20-40	25-50	Strongly cemented	Low	Low	Moderate
146B:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
Skanee	Fragipan	12-20	15-30	Strongly cemented	High	Moderate	High
147A:							
Skanee	Fragipan	12-20	15-30	Strongly cemented	High	Moderate	High
Gay	---	---	---	---	High	High	Moderate
148B:							
Shoepac	---	---	---	---	Moderate	Moderate	Moderate
Ensley	---	---	---	---	High	High	Low
149:							
Evart	---	---	---	---	Moderate	High	Low
Cathro	---	---	---	---	High	High	Low
150:							
Shag	---	---	---	---	High	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
151A:							
Spear	---	---	---	---	High	High	Moderate
153D:							
Ishpeming	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
153F:							
Ishpeming	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
154B:							
Rubicon	---	---	---	---	Low	Low	High
Sayner	---	---	---	---	Low	Low	Moderate
154D:							
Rubicon	---	---	---	---	Low	Low	High
Sayner	---	---	---	---	Low	Low	Moderate
155A:							
Zeba	Bedrock (lithic)	20-40	---	Indurated	High	Moderate	Moderate
	Bedrock (paralithic)	20-35	0-6	Moderately cemented			
Jacobsville	Bedrock (lithic)	20-40	---	Indurated	High	High	High
156B:							
Duel	Bedrock (lithic)	20-40	---	Indurated	Low	Low	Moderate
157B:							
Reade	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate	Moderate
Nahma	Bedrock (lithic)	20-40	---	Indurated	High	High	Low
158C:							
Munising	Fragipan	15-24	25-50	Strongly cemented	Moderate	Low	High
Onota	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	Moderate
Yalmer	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
159A:							
Jeske	Bedrock (paralithic)	10-20	6-10	Strongly cemented	Low	Low	High
	Bedrock (lithic)	20-40	---	Indurated			
160B:							
Paquin	Ortstein	10-16	1-10	Strongly cemented	Low	Low	High
Finch	Ortstein	7-12	5-15	Strongly cemented	Moderate	High	Moderate
161B:							
Yellowdog	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
162B:							
Buckroe----------------	Bedrock (lithic)	10-20	---	Indurated	Low	Low	High
165B:							
Chocolay---------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate	Low
Waiska-----------------	---	---	---	---	Low	Low	Moderate
166:							
Skandia----------------	Bedrock (lithic)	20-51	---	Indurated	High	High	Moderate
167:							
Skandia----------------	Bedrock (lithic)	20-51	---	Indurated	High	High	Moderate
Jacobsville------------	Bedrock (lithic)	20-40	---	Indurated	High	High	High
168B:							
Yellowdog--------------	Bedrock (lithic)	20-40	---	Indurated	Low	Low	High
Burt-------------------	Bedrock (lithic)	10-20	---	Indurated	Moderate	High	High
170B:							
Chocolay---------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate	Low
171B:							
Paavola----------------	Fragipan	20-38	25-60	Strongly cemented	Low	Moderate	Moderate
172D:							
Buckroe----------------	Bedrock (lithic)	10-20	---	Indurated	Low	Low	High
Rock outcrop-----------	Bedrock (lithic)	0-4	---	Indurated	None	---	---
172F:							
Buckroe----------------	Bedrock (lithic)	10-20	---	Indurated	Low	Low	High
Rock outcrop-----------	Bedrock (lithic)	0-4	---	Indurated	None	---	---
173B:							
Pence------------------	---	---	---	---	Low	Low	Moderate
173D:							
Pence------------------	---	---	---	---	Low	Low	Moderate
174D:							
Yalmer-----------------	Fragipan	20-40	25-60	Strongly cemented	Low	Low	Moderate
Rubicon----------------	---	---	---	---	Low	Low	High
Urban land.							
175E:							
Kalkaska---------------	---	---	---	---	Low	Low	High
Waiska-----------------	---	---	---	---	Low	Low	Moderate
175F:							
Kalkaska---------------	---	---	---	---	Low	Low	High
Waiska-----------------	---	---	---	---	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Depth to top	Thickness	Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
176B:							
Greenwood	---	---	---	---	High	High	High
Croswell	---	---	---	---	Low	Low	Moderate
177E:							
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
177F:							
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
178D:							
Schweitzer	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Kalkaska	---	---	---	---	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
178F:							
Schweitzer	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Kalkaska	---	---	---	---	Low	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
179E:							
Schweitzer	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Michigamme	Bedrock (lithic)	20-40	---	---	Moderate	Low	High
180E:							
Kalkaska	---	---	---	---	Low	Low	High
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
180F:							
Kalkaska	---	---	---	---	Low	Low	High
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
181E:							
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
Tokiahok	Fragipan	20-40	25-50	Strongly cemented	Low	Low	Moderate
181F:							
Frohling	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
Tokiahok	Fragipan	20-40	25-50	Strongly cemented	Low	Low	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
184C:							
Dishno-----------------	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
Witbeck----------------	---	---	---	---	High	High	Moderate
Rock outcrop.							
185B:							
Northland--------------	---	---	---	---	Moderate	Moderate	Low
187B:							
Reade------------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate	Moderate
190B:							
Emmet------------------	---	---	---	---	Moderate	Low	Moderate
Cunard-----------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	Low
191B:							
Nahma------------------	Bedrock (lithic)	20-40	---	Indurated	High	High	Low
Sundell----------------	Bedrock (lithic)	20-40	---	Indurated	High	Moderate	Low
193E:							
Frohling---------------	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
Tokiahok---------------	Fragipan	20-40	25-50	Strongly cemented	Low	Low	Moderate
194E:							
Sporley----------------	---	---	---	---	High	Low	High
196E:							
Frohling---------------	Fragipan	15-25	25-65	Strongly cemented	Moderate	Low	Moderate
Onota------------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	Moderate
Tokiahok---------------	Fragipan	20-40	25-50	Strongly cemented	Low	Low	Moderate
197B:							
Shoepac----------------	---	---	---	---	Moderate	Moderate	Moderate
Trenary----------------	---	---	---	---	Moderate	Low	Moderate
198B:							
Shoepac----------------	---	---	---	---	Moderate	Moderate	Moderate
Reade------------------	Bedrock (lithic)	20-40	---	Indurated	Moderate	Moderate	Moderate
199. Udorthents, ash							
200A:							
Charlevoix-------------	Bedrock (lithic)	60-80	---	Indurated	High	Moderate	Moderate
Ensley-----------------	Bedrock (lithic)	60-80	---	Indurated	High	High	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
201B:							
Sauxhead	Bedrock (lithic)	10-20	---	Indurated	Low	Low	High
Jacobsville	Bedrock (lithic)	20-40	---	Indurated	High	High	High
202B:							
Sauxhead	Bedrock (lithic)	10-20	---	Indurated	Low	Low	High
203A:							
Au Gres	---	---	---	---	Moderate	Low	Moderate
Deford	---	---	---	---	Moderate	Low	Moderate
204B:							
Gogebic	Fragipan	15-30	20-50	Strongly cemented	Moderate	Moderate	High
Tula	Fragipan	15-30	15-40	Strongly cemented	High	High	Moderate
206B:							
Traunik	---	---	---	---	Low	Low	Moderate
207D:							
Dishno	Bedrock (lithic)	40-60	---	Indurated	Moderate	Moderate	High
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-4	---	Indurated	None	---	---
208F:							
Keewaydin	---	---	---	---	Low	Low	Moderate
Michigamme	Bedrock (lithic)	20-40	---	Indurated	Moderate	Low	High
209B:							
Garlic	---	---	---	---	Low	Low	High
Fence	---	---	---	---	High	Low	High
M-W. Miscellaneous water							
W. Water							

Table 24.--Classification of the Soils

Soil name	Family or higher taxonomic class
Alcona	Coarse-loamy, mixed, active, frigid Alfic Haplorthods
Amasa	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplorthods
Aquents	Aquents
Au Gres	Sandy, mixed, frigid Typic Endoaquods
Buckroe	Sandy-skeletal, mixed, frigid Lithic Udorthents
Burt	Siliceous, frigid Lithic Psammaquents
Carbondale	Euic Hemic Borosaprists
Carlshend	Loamy, mixed, superactive, frigid, shallow Oxyaquic Haplorthods
Cathro	Loamy, mixed, euic Terric Borosaprists
Chabeneau	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Oxyaquic Haplorthods
Champion	Coarse-loamy, mixed, superactive, frigid Oxyaquic Fragiorthods
Channing	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Endoaquods
Charlevoix	Coarse-loamy, mixed, superactive, frigid Argic Endoaquods
Chippeny	Euic Lithic Borosaprists
Chocolay	Loamy-skeletal, mixed, superactive, frigid Oxyaquic Haplorthods
Croswell	Sandy, mixed, frigid Oxyaquic Haplorthods
Cunard	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Dawson	Sandy or sandy-skeletal, dysic Terric Borosaprists
Deer Park	Mixed, frigid Spodic Udipsamments
Deford	Mixed, frigid Typic Psammaquents
Dishno	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Oxyaquic Haplorthods
Duel	Sandy, mixed, frigid Entic Haplorthods
Emmet	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Ensley	Coarse-loamy, mixed, active, nonacid, frigid Aeric Endoaquents
Escanaba	Sandy over loamy, mixed, superactive, frigid Alfic Haplorthods
Evart	Sandy, mixed, frigid Fluvaquentic Endoaquolls
Farquar	Sandy-skeletal, mixed, frigid Oxyaquic Haplorthods
Fence	Coarse-silty, mixed, superactive, frigid Alfic Oxyaquic Haplorthods
Finch	Sandy, mixed, frigid, ortstein Typic Duraquods
Frohling	Coarse-loamy, mixed, active, frigid Alfic Fragiorthods
Garlic	Sandy, mixed, frigid, ortstein Typic Haplorthods
Gay	Coarse-loamy, mixed, active, nonacid, frigid Typic Epiaquepts
Gogebic	Coarse-loamy, mixed, superactive, frigid Alfic Oxyaquic Fragiorthods
Goodman	Coarse-loamy, mixed, superactive, frigid Alfic Haplorthods
Grayling	Mixed, frigid Typic Udipsamments
Greenwood	Dysic Typic Borohemists
Histosols	Histosols
Ishpeming	Sandy, mixed, frigid Entic Haplorthods
Jacobsville	Coarse-loamy, mixed, active, nonacid, frigid Typic Endoaquepts
Jeske	Siliceous, acid, frigid, shallow Typic Psammaquents
Kalkaska	Sandy, mixed, frigid Typic Haplorthods
Karlin	Sandy, mixed, frigid Entic Haplorthods
Keewaydin	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplorthods
Keweenaw	Sandy, mixed, frigid Alfic Haplorthods
Kinross	Sandy, mixed, frigid Typic Endoaquods
Liminga	Sandy, mixed, frigid Typic Haplorthods
Mancelona	Sandy, mixed, frigid Alfic Haplorthods
Mashek	Coarse-loamy, mixed, active, frigid Oxyaquic Eutroboralfs
Michigamme	Coarse-loamy, mixed, superactive, frigid Typic Haplorthods
Minocqua	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Typic Endoaquepts
Munising	Coarse-loamy, mixed, active, frigid Alfic Oxyaquic Fragiorthods
Nadeau	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Nahma	Coarse-loamy, mixed, active, nonacid, frigid Histic Humaquepts
Net	Coarse-loamy, mixed, superactive, frigid Typic Fragiaquods
Northland	Coarse-loamy, mixed, superactive Oxyaquic Eutroboralfs
Ocqueoc	Sandy over loamy, mixed, active, frigid Entic Haplorthods
Onaway	Fine-loamy, mixed, superactive, frigid Typic Eutroboralfs
Onota	Coarse-loamy, mixed, superactive, frigid Typic Haplorthods
Paavola	Sandy-skeletal, mixed, frigid Oxyaquic Fragiorthods
Paquin	Sandy, mixed, frigid, ortstein Typic Durorthods
Pelissier	Sandy-skeletal, mixed, frigid Entic Haplorthods

Table 24.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Pelkie	Mixed, frigid Oxyaquic Udipsamments
Pence	Sandy, mixed, frigid Entic Haplorthods
Peshekee	Loamy, mixed, semiactive, frigid Lithic Haplorthods
Pleine	Coarse-loamy, mixed, superactive, nonacid, frigid Histic Humaquepts
Reade	Coarse-loamy, mixed, superactive, frigid Oxyaquic Haplorthods
Rousseau	Sandy, mixed, frigid Entic Haplorthods
Rubicon	Sandy, mixed, frigid Entic Haplorthods
Sagola	Coarse-loamy, mixed, semiactive, frigid Alfic Haplorthods
Sauxhead	Sandy-skeletal, mixed, frigid Lithic Udorthents
Sayner	Sandy, mixed, frigid Entic Haplorthods
Schweitzer	Mixed, superactive Alfic Fragiorthods
Shag	Coarse-silty, mixed, active, frigid Typic Epiaquolls
Shoepac	Coarse-loamy, mixed, superactive, frigid Oxyaquic Haplorthods
Skandia	Dysic Lithic Borosaprists
Skanee	Coarse-loamy, mixed, active, frigid Argic Fragiaquods
Solona	Coarse-loamy, mixed, superactive, frigid Aquic Eutroboralfs
Spear	Coarse-silty, mixed, superactive Glossaquic Eutroboralfs
Sporley	Coarse-silty, mixed, active, frigid Alfic Haplorthods
Sturgeon	Coarse-silty over sandy or sandy-skeletal, mixed, superactive, nonacid, frigid Aquic Udifluvents
Summerville	Loamy, mixed, active, frigid Lithic Eutrochrepts
Sundell	Coarse-loamy, mixed, superactive Aquic Haploborolls
Sundog	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Entic Haplorthods
Tawas	Sandy or sandy-skeletal, mixed, euic Terric Borosaprists
Tokiahok	Sandy, mixed, frigid Alfic Fragiorthods
Traunik	Sandy-skeletal, mixed, frigid Entic Haplorthods
Trenary	Coarse-loamy, mixed, semiactive, frigid Alfic Haplorthods
Tula	Coarse-loamy, mixed, superactive, frigid Alfic Haplaquods
Udipsamments	Udipsamments
Udorthents	Udorthents
Vanriper	Loamy-skeletal, mixed, superactive, frigid Entic Haplorthods
Voelker	Sandy, mixed, frigid, shallow, ortstein Typic Durorthods
Wabeno	Coarse-loamy, mixed, superactive, frigid Oxyaquic Fragiorthods
Waiska	Sandy-skeletal, mixed, frigid Typic Haplorthods
Witbeck	Coarse-loamy, mixed, semiactive, nonacid, frigid Histic Humaquepts
Yalmer	Sandy, mixed, frigid Oxyaquic Fragiorthods
Yellowdog	Sandy-skeletal, mixed, frigid Typic Udorthents
Zeba	Coarse-loamy, mixed, active, frigid Argic Endoaquods

Interpretive Groups

Interpretive Groups

(Dashes indicate that no interpretive group is assigned)

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
10B---------------------- Grayling	6s	Not prime farmland	4S	5.7a	PVD	PVC
10D---------------------- Grayling	7s	Not prime farmland	4S	5.7a	PVD	PVC
10E---------------------- Grayling	7s	Not prime farmland	4R	5.7a	PVD	PVC
11C---------------------- Deer Park	7s	Not prime farmland	4S	5.3a	PVC	QAE
11D---------------------- Deer Park	7s	Not prime farmland	4S	5.3a	PVC	QAE
12B---------------------- Rubicon	6s	Not prime farmland	4S	5.3a	AQVac	QAE
12D---------------------- Rubicon	7s	Not prime farmland	4S	5.3a	AQVac	QAE
12E---------------------- Rubicon	7s	Not prime farmland	4R	5.3a	AQVac	QAE
12F---------------------- Rubicon	7s	Not prime farmland	4R	5.3a	AQVac	QAE
13B---------------------- Kalkaska	4s	Not prime farmland	3S	5a	ATD-D	TM
13D---------------------- Kalkaska	6s	Not prime farmland	3S	5a	ATD-D	TM
13E---------------------- Kalkaska	7s	Not prime farmland	3R	5a	ATD-D	TM
13F---------------------- Kalkaska	7s	Not prime farmland	3R	5a	ATD-D	TM
14B---------------------- Rousseau	3s	Not prime farmland	5S	4a	AQVac	TMV
14D---------------------- Rousseau	4e	Not prime farmland	5S	4a	AQVac	TMV
15A---------------------- Croswell	4s	Not prime farmland	5S	5a	QAE	TMC-V
16A---------------------- Paquin	6s	Not prime farmland	3S	5a	ATD-D	TMC
17A---------------------- Au Gres	4w	Not prime farmland	6W	5b	TMC	TMC-V

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
18----------------------- Kinross	6w	Not prime farmland	2W	5c-a	PCS	TMC-V
19----------------------- Deford	5w	Not prime farmland	4W	5c	TMC	TTS
20B----------------------		Not prime farmland			AQVac	TMV
Rousseau----------------	3s		5S	4a		
Ocqueoc-----------------	3s		3S	4/2a		
20D----------------------		Not prime farmland			AQVac	TMV
Rousseau----------------	4e		5S	4a		
Ocqueoc-----------------	4e		3S	4/2a		
20E----------------------		Not prime farmland			AQVac	TMV
Rousseau----------------	7e		5R	4a		
Ocqueoc-----------------	7e		3R	4/2a		
22B---------------------- Alcona	2e	Prime farmland	3L	3a-s	ATD	TM
24B---------------------- Munising	2e	Not prime farmland	3W	3a-af	ATD	TM
24D---------------------- Munising	4e	Not prime farmland	3W	3a-af	ATD	TM
25B----------------------		Not prime farmland			ATD	TM
Munising----------------	2e		3W	3a-af		
Yalmer------------------	3s		3D	4a-af		
25D----------------------		Not prime farmland			ATD	TM
Munising----------------	4e		3W	3a-af		
Yalmer------------------	4e		3D	4a-af		
26A---------------------- Skanee	2w	Not prime farmland	3W	3b-af	TMC-D	TMC
27----------------------- Gay	6s	Not prime farmland	3W	3c	FI	TTS
28B---------------------- Keweenaw	3e	Not prime farmland	3A	4a-a	ATD-D	TM
28D---------------------- Keweenaw	4e	Not prime farmland	3A	4a-a	ATD-D	TM
28E---------------------- Keweenaw	7e	Not prime farmland	3R	4a-a	ATD-D	TM
29B---------------------- Yalmer	3s	Not prime farmland	3D	4a-af	ATD	TM
29D---------------------- Yalmer	4e	Not prime farmland	3D	4a-af	ATD	TM

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
31D---------------------- Trenary	4e	Not prime farmland	3L	3a	AVO	AVO-A
32A---------------------- Charlevoix	2w	Prime farmland*	3W	3b	AVO-CI	TMC-D
33----------------------- Ensley	5w	Prime farmland*	3W	3c	FI	TTM
34B---------------------- Onaway	2e	Prime farmland	3L	2.5a	AVO	AVO-A
34D---------------------- Onaway	4e	Not prime farmland	3L	2.5a	AVO	AVO-A
34E---------------------- Onaway	6e	Not prime farmland	3R	2.5a	AVO	AVO-A
35B---------------------- Champion	5s	Not prime farmland	3W	3a-af	ATD	---
35D---------------------- Champion	6s	Not prime farmland	3W	3a-af	ATD	---
36A---------------------- Net	7s	Not prime farmland	3X	3b-af	TMC-D	---
37----------------------- Witbeck	7s	Not prime farmland	3X	3c	TTS	FI
38B---------------------- Pence	3e	Not prime farmland	3A	4a-a	AQVac	TMV
38D---------------------- Pence	6e	Not prime farmland	3A	4a-a	AQVac	TMV
38E---------------------- Pence	7e	Not prime farmland	3R	4a-a	AQVac	TMV
39B---------------------- Amasa	2e	Prime farmland	3L	3/5a-a	ATD	TM
39D---------------------- Amasa	4e	Not prime farmland	3L	3/5a-a	ATD	TM
39E---------------------- Amasa	7e	Not prime farmland	3R	3/5a-a	ATD	TM
40B---------------------- Waiska	6s	Not prime farmland	3A	Ga	ATD	AVO
40D---------------------- Waiska	6s	Not prime farmland	3A	Ga	ATD	AVO
41A---------------------- Channing	3w	Not prime farmland	2W	5b-h	TMC-V	TMC

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type: Primary	Habitat type: Secondary
42 Minoqua	6w	Prime farmland*	3W	3/5c	PCS	TTS
43B Karlin	3s	Not prime farmland	3A	4a	TM	AQVac
43D Karlin	4e	Not prime farmland	3A	4a	TM	AQVac
44B Carlshend	3s	Not prime farmland	3D	3/Ra	ATD	TM
45A Zeba	5s	Not prime farmland	2W	3/Rbc	TMC	TMC-V
46 Jacobsville	6s	Not prime farmland	2W	M/Rc	TTS	FMC
48 Burt	7w	Not prime farmland	2W	Rbc	TTS	FMC
50A Sundell	3w	Not prime farmland	2W	3/Rbc	TTP	TMC
51 Nahma	5w	Not prime farmland	4W	3/Rbc	TTM	FI
52B Summerville	3s	Not prime farmland	3D	Ra	AVO	AVO-A
55F		Not prime farmland			ATD	TMV
Michigamme	7s		3R	3/Ra		
Rock outcrop	8		---	---		
56D		Not prime farmland			ATD	AQVac
Peshekee	7s		2D	Ra		
Rock outcrop	8		---	---		
56E		Not prime farmland			ATD	AQVac
Peshekee	7s		2R	Ra		
Rock outcrop	8		---	---		
56F		Not prime farmland			ATD	AQVac
Peshekee	7s		2R	Ra		
Rock outcrop	8		---	---		
57		Not prime farmland			TTS	TTM
Carbondale	6w		5W	Mc		
Tawas	6w		5W	M/4c		
58		Not prime farmland			PCS	---
Greenwood	7w		2W	Mc-a		
Dawson	7w		2W	M/4c-9		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type: Primary	Habitat type: Secondary
59----------------------		Not prime farmland				
Chippeny----------------	7w		4W	M/Rc	TTS	TTM
Nahma-------------------	5w		4W	3/Rbc	TTM	FI
60---------------------- Histosols and Aquents	6w	Not prime farmland	---	---	---	---
61. Pits, borrow						
62B. Udorthents and Udipsamments						
64. Pits and Dumps						
65B. Udorthents-Urban land						
66B. Udipsamments-Urban land						
67B---------------------		Not prime farmland			---	---
Urban land.						
Rubicon-----------------	6s		4S	5.3a		
68. Pits, quarries						
69B--------------------- Escanaba	3s	Not prime farmland	3S	4/2a	AVO	ATD
69D--------------------- Escanaba	4e	Not prime farmland	3S	4/2a	AVO	ATD
70B--------------------- Nadeau	3s	Not prime farmland	3L	3/5a	TM	AVO
70D--------------------- Nadeau	4e	Not prime farmland	3L	3/5a	TM	AVO
71B---------------------		Not prime farmland			FMC	AVO-CI
Evart-------------------	7w		2W	L-4c		
Pelkie------------------	4s		3A	L-4a		
Sturgeon----------------	3w		3W	L-4c		
72B--------------------- Emmet	2e	Prime farmland	3L	3a	AVO	AVO-A
72D--------------------- Emmet	4e	Not prime farmland	3L	3a	AVO	AVO-A

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
72E---------------------- Emmet	6e	Not prime farmland	3R	3a	AVO	AVO-A
73B---------------------- Gogebic	6s	Not prime farmland	3W	3a-af	ATD	AVO
73D---------------------- Gogebic	6s	Not prime farmland	3W	3a-af	ATD	AVO
74D----------------------		Not prime farmland			ATD	AVO
Schweitzer--------------	6s		3X	3a-af		
Michigamme--------------	6s		3X	3/Ra		
Rock outcrop------------	8		---	---		
74F----------------------		Not prime farmland			ATD	AVO
Schweitzer--------------	7s		3R	3a-af		
Michigamme--------------	7s		3R	3/Ra		
Rock outcrop------------	8		---	---		
76C----------------------		Not prime farmland			ATD-D	TM
Garlic------------------	6s		3S	4a		
Alcona------------------	3e		3L	3a-s		
Voelker-----------------	6s		3S	4/2a		
76E----------------------		Not prime farmland			ATD-D	TM
Garlic------------------	7s		3R	4a		
Alcona------------------	6e		3R	3a-s		
Voelker-----------------	7s		3R	4/2a		
76F----------------------		Not prime farmland			ATD-D	TM
Garlic------------------	7s		3R	4a		
Alcona------------------	7e		3R	3a-s		
Voelker-----------------	7s		3R	4/2a		
77D----------------------		Not prime farmland			ATD-D	TM
Garlic------------------	6s		3S	4a		
Alcona------------------	4e		3L	3a-s		
Voelker-----------------	7s		3S	4/2a		
77E----------------------		Not prime farmland			ATD-D	TM
Garlic------------------	7s		3R	4a		
Alcona------------------	7e		3R	3a-s		
Voelker-----------------	7s		3R	4/2a		
78C----------------------		Not prime farmland			ATD-D	TM
Keweenaw----------------	3e		3A	4a-a		
Kalkaska----------------	6s		3S	5a		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
78E		Not prime farmland			ATD-D	TM
Keweenaw	6e		3R	4a-a		
Kalkaska	7s		3R	5a		
78F		Not prime farmland			ATD-D	TM
Keweenaw	7e		3R	4a-a		
Kalkaska	7s		3R	5a		
79B		Not prime farmland			ATD-D	TM
Keweenaw	3e		3A	4a-a		
Munising	2e		3W	3a-af		
80B		Not prime farmland			AQVac	TMV
Sayner	4s		7A	4a		
Rubicon	6s		4S	5.3a		
80D		Not prime farmland			AQVac	TMV
Sayner	7s		7A	4a		
Rubicon	7s		4S	5.3a		
80E		Not prime farmland			AQVac	TMV
Sayner	7s		7R	4a		
Rubicon	7s		4R	5.3a		
81B Pelissier	6s	Not prime farmland	8F	Ga	AQVac	TMV
81D Pelissier	6s	Not prime farmland	8F	Ga	AQVac	TMV
81E Pelissier	7s	Not prime farmland	8R	Ga	AQVac	TMV
84D		Not prime farmland			AQVac	QAE
Rubicon	7s		4R	5.3a		
Ishpeming	6s		5R	4/Ra		
Rock outcrop	8		---	---		
84F		Not prime farmland			AQVac	QAE
Rubicon	7s		4R	5.3a		
Ishpeming	7s		5R	4/Ra		
Rock outcrop	8		---	---		
85A Solona	2w	Prime farmland*	3W	3b	AVO-CI	TMC-D
86B Mashek	2e	Prime farmland	3D	3a	AVO	AVO-A

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
87B--------------------- Cunard	2e	Not prime farmland	3D	3/Ra	AVO	AVO-A
88----------------------		Not prime farmland			TTM	FI
Cathro------------------	6w		5W	M/3c		
Ensley------------------	5w		3W	3c		
89B---------------------		Prime farmland*			AVO	TMC
Emmet-------------------	2e		3L	3a		
Solona------------------	2w		3W	3b		
90B---------------------		Not prime farmland			AVO	AVO-A
Emmet-------------------	2e		3L	3a		
Escanaba----------------	3s		3S	4a		
90D---------------------		Not prime farmland			AVO	AVO-A
Emmet-------------------	4e		3L	3a		
Escanaba----------------	4e		3S	4a		
91B---------------------		Not prime farmland			AVO	TM
Onaway------------------	2e		3L	2.5a		
Nadeau------------------	3s		3L	3/5a		
92A---------------------		Prime farmland*			FI	TMC
Ensley------------------	5w		3W	3c		
Solona------------------	2w		3W	3b		
93----------------------		Not prime farmland			TTS	PO
Tawas-------------------	6w		5W	M/4c		
Deford------------------	5w		4W	5c		
94B---------------------		Not prime farmland			ATD-D	TM
Keweenaw----------------	3e		3A	4a-a		
Kalkaska----------------	4s		3S	5a		
94D---------------------		Not prime farmland			ATD-D	TM
Keweenaw----------------	4e		3A	4a-a		
Kalkaska----------------	6s		3S	5a		
94E---------------------		Not prime farmland			ATD-D	TM
Keweenaw----------------	7e		3R	4a-a		
Kalkaska----------------	7s		3R	5a		
95B--------------------- Liminga	3s	Not prime farmland	3S	4a	ATD-D	TM
95D--------------------- Liminga	3e	Not prime farmland	3S	4a	ATD-D	TM

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
100E		Not prime farmland			AQVac	TMV
Sayner	7s		7R	4a		
Rubicon	7s		4R	5.3a		
100F		Not prime farmland			AQVac	TMV
Sayner	7s		7R	4a		
Rubicon	7s		4R	5.3a		
103D		Not prime farmland			TMV	AQVac
Rubicon	7s		4S	5.3a		
Ocqueoc	7e		3S	4/2a		
Rock outcrop	8		---	---		
104C Fence	3e	Not prime farmland	3L	2.5a	AVO	ATD
105C Munising	3e	Not prime farmland	3W	3a-af	ATD	TM
106B		Not prime farmland			AQVac	TMV
Sagola	6s		4L	3a		
Rubicon	6s		4S	5.3a		
106D		Not prime farmland			AQVac	TMV
Sagola	6s		4L	3a		
Rubicon	7s		4S	5.3a		
107B		Not prime farmland			ATD	TMV
Goodman	6s		3L	2.5a		
Sundog	6s		3L	2.5/5a		
107D		Not prime farmland			ATD	TMV
Goodman	6s		3L	2.5a		
Sundog	7s		3L	2.5/5a		
107F		Not prime farmland			ATD	TMV
Goodman	7s		3R	2.5a		
Sundog	7s		3R	2.5/5a		
108B		Not prime farmland			AVO	ATD
Goodman	6s		3L	2.5a		
Sundog	6s		3L	2.5/5a		
Wabeno	6s		3W	3a-af		
108D		Not prime farmland			AVO	ATD
Goodman	6s		3L	2.5a		
Sundog	7s		3L	2.5/5a		
Wabeno	6s		3W	3a-af		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type: Primary	Habitat type: Secondary
109B---------------------		Not prime farmland			AQVac	QAE
Rubicon-----------------	7s		4S	5.3a		
Keweenaw----------------	7s		2A	4a-a		
109D---------------------		Not prime farmland			AQVac	QAE
Rubicon-----------------	7s		4S	5.3a		
Keweenaw----------------	7s		2A	4a-a		
109F---------------------		Not prime farmland			AQVac	QAE
Rubicon-----------------	7s		4R	5.3a		
Keweenaw----------------	7s		2R	4a-a		
110B---------------------		Not prime farmland			AQVac	TMV
Nadeau------------------	3s		3L	3/5a		
Mancelona---------------	3s		3A	4a		
110D---------------------		Not prime farmland			AQVac	TMV
Nadeau------------------	4e		3L	3/5a		
Mancelona---------------	4e		3A	4a		
111B--------------------- Grayling	6s	Not prime farmland	4S	5.7a	PVD	PVC
112D---------------------		Not prime farmland			ATD	TMV
Keewaydin---------------	7s		3X	3/5a		
Michigamme--------------	6s		3X	3/Ra		
Rock outcrop------------	8		---	---		
112F---------------------		Not prime farmland			ATD	TMV
Keewaydin---------------	7s		3R	3/5a		
Michigamme--------------	7s		3R	3/Ra		
Rock outcrop------------	8		---	---		
113B--------------------- Vanriper	7s	Not prime farmland	3X	Ga	ATD	AVO
113D--------------------- Vanriper	7s	Not prime farmland	3X	Ga	ATD	AVO
113F--------------------- Vanriper	7s	Not prime farmland	3R	Ga	ATD	AVO
114B--------------------- Vanriper	7s	Not prime farmland	3X	Ga	ATD	AVO
114D--------------------- Vanriper	7s	Not prime farmland	3X	Ga	ATD	AVO
114F--------------------- Vanriper	7s	Not prime farmland	3R	Ga	ATD	AVO

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
117B--------------------- Fence	2e	Prime farmland	3L	2.5a	AVO	AVO-A
118A---------------------		Not prime farmland			TMC-V	QAE
Croswell----------------	4s		5S	5a		
Deford------------------	5w		4W	5c		
119B---------------------		Not prime farmland			ATD	TM
Yalmer------------------	4e		3D	4a-af		
Kalkaska----------------	4s		3S	5a		
119D---------------------		Not prime farmland			ATD	TM
Yalmer------------------	4e		3D	4a-af		
Kalkaska----------------	6s		3S	5a		
121B--------------------- Onota	3e	Not prime farmland	3D	3/Ra	ATD	TM
122---------------------- Pleine	7s	Not prime farmland	6W	3c	PI	TTM
123A--------------------- Tula	7s	Not prime farmland	3W	3b-af	TMC-D	AVO-CI
124B---------------------		Not prime farmland			ATD	AVO
Gogebic-----------------	6s		3W	3a-af		
Dishno------------------	6s		3W	3a		
124D---------------------		Not prime farmland			ATD	AVO
Gogebic-----------------	6s		3W	3a-af		
Dishno------------------	6s		3W	3a		
125D---------------------		Not prime farmland			ATD-D	TMV
Keweenaw----------------	7s		3X	4a-a		
Kalkaska----------------	7s		3X	5a		
Rock outcrop------------	8		---	---		
125F---------------------		Not prime farmland			ATD-D	TMV
Keweenaw----------------	7s		3R	4a-a		
Kalkaska----------------	7s		3R	5a		
Rock outcrop------------	8		---	---		
126B--------------------- Sundog	2e	Prime farmland	2L	2.5/5a	TMV	---
126D--------------------- Sundog	4e	Not prime farmland	2L	2.5/5a	TMV	---
126E--------------------- Sundog	7e	Not prime farmland	2R	2.5/5a	TMV	---

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
127B-------------------- Sundog	6s	Not prime farmland	3L	2.5/5a	ATD	---
127D-------------------- Sundog	7s	Not prime farmland	3L	2.5/5a	ATD	---
127F-------------------- Sundog	7s	Not prime farmland	3R	2.5/5a	ATD	---
128B--------------------		Not prime farmland			ATD-D	TM
Kalkaska----------------	4s		3S	5a		
Waiska------------------	6s		3A	Ga		
128D--------------------		Not prime farmland			ATD-D	TM
Kalkaska----------------	6s		3S	5a		
Waiska------------------	6s		3A	Ga		
128E--------------------		Not prime farmland			ATD-D	TM
Kalkaska----------------	7s		3R	5a		
Waiska------------------	6s		3R	Ga		
129C--------------------		Not prime farmland			ATD	---
Kalkaska----------------	6s		3S	5a		
Munising----------------	3e		3W	3a-af		
130A-------------------- Chabeneau	3s	Prime farmland	3L	3/5a	TMC-V	TMV
131---------------------		Not prime farmland			TTS	FI
Witbeck-----------------	7s		3W	3c		
Cathro------------------	7s		5W	M/3c		
132. Slickens						
133B--------------------		Not prime farmland			ATD	TMV
Keewaydin---------------	6s		3L	3/5a		
Dishno------------------	6s		3W	3a		
133D--------------------		Not prime farmland			ATD	TMV
Keewaydin---------------	6s		3L	3/5a		
Dishno------------------	6s		3W	3a		
134B-------------------- Keewaydin	6s	Not prime farmland	3L	3/5a	ATD	---
134D-------------------- Keewaydin	6s	Not prime farmland	3L	3/5a	ATD	---
134F-------------------- Keewaydin	7s	Not prime farmland	3R	3/5a	ATD	---

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
135A		Not prime farmland			TTS	TMC-D
Witbeck	7s		3X	3c		
Net	7s		3X	3b-af		
136A		Prime farmland*			TMC-V	PCS
Minocqua	6w		3W	2.5/5c		
Channing	3w		2W	5b-h		
137D		Not prime farmland			ATD	TMV
Keewaydin	7s		3L	3/5a		
Sundog	7s		3L	2.5/5a		
137F		Not prime farmland			ATD	TMV
Keewaydin	7s		3R	3/5a		
Sundog	7s		3R	2.5/5a		
138D		Not prime farmland			TMV	---
Sundog	7s		2X	2.5/5a		
Rock outcrop	8		---	---		
138F		Not prime farmland			TMV	---
Sundog	7s		2R	2.5/5a		
Rock outcrop	8		---	---		
139B Sundog	7s	Not prime farmland	2X	2.5/5a	TMV	---
139D Sundog	7s	Not prime farmland	2X	2.5/5a	TMV	---
140B		Not prime farmland			ATD	---
Champion	5s		3W	3a-af		
Dishno	6s		3W	3a		
140D		Not prime farmland			ATD	---
Champion	6s		3W	3a-af		
Dishno	6s		3W	3a		
141D		Not prime farmland			AQVac	TMV
Pelissier	7s		8F	Ga		
Rock outcrop	8		---	---		
142B Pelissier	6s	Not prime farmland	8F	Ga	AQVac	TMV
142D Pelissier	6s	Not prime farmland	8F	Ga	AQVac	TMV

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type: Primary	Habitat type: Secondary
144B--------------------- Farquar	6s	Not prime farmland	4F	Ga	AQVac	TMC-V
145C---------------------		Not prime farmland			ATD	---
Munising----------------	6s		3W	3a-af		
Yalmer------------------	6s		3D	4a-af		
146B---------------------		Not prime farmland				
Munising----------------	2e		3W	3a-af	ATD	---
Skanee------------------	2w		3W	3b-af	TMC-D	---
147A---------------------		Not prime farmland				
Skanee------------------	5s		3W	3b-af	TMC-D	---
Gay---------------------	6s		3W	3c	FI	---
148B---------------------		Not prime farmland				
Shoepac-----------------	3s		3W	3a	AVO	---
Ensley------------------	5w		3W	3c	FI	---
149----------------------		Not prime farmland			FMC-C	FMC
Evart-------------------	7w		2W	L-4c		
Cathro------------------	6w		5W	M/3c		
150---------------------- Shag	5w	Not prime farmland	5W	2.5c	FI	FMC
151A--------------------- Spear	2w	Prime farmland*	3W	2.5b	TMC-D	TTP
153D---------------------		Not prime farmland			AQVac	TMV
Ishpeming---------------	7s		5X	4/Ra		
Rock outcrop------------	8		---	---		
153F---------------------		Not prime farmland			AQVac	TMV
Ishpeming---------------	7s		5R	4/Ra		
Rock outcrop------------	8		---	---		
154B---------------------		Not prime farmland			AQVac	QAE
Rubicon-----------------	6s		4S	5.3a		
Sayner------------------	4s		7A	4a		
154D---------------------		Not prime farmland			AQVac	QAE
Rubicon-----------------	7s		4S	5.3a		
Sayner------------------	7s		7A	4a		
155A---------------------		Not prime farmland		3/Rbc		
Zeba--------------------	5s		2W		TMC	---
Jacobsville-------------	6s		2W		TTS	---

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
156B--------------------- Duel	6s	Not prime farmland	2D	4/Ra	AVO-A	AVO
157B---------------------		Not prime farmland				
Reade-------------------	3s		3D	3/Ra	AVO	AVO-CI
Nahma-------------------	5w		4W	3/Rbc	FI	
158C---------------------		Not prime farmland			ATD	---
Munising----------------	3e		3W	3a-af		
Onota-------------------	4e		3D	3/Ra		
Yalmer------------------	3e		3D	4a-af		
159A--------------------- Jeske	7w	Not prime farmland	2D	4/Rbc	TMC	---
160B---------------------		Not prime farmland				
Paquin------------------	6s		3S	5a	ATD-D	
Finch-------------------	4w		4W	5b-h	TMC-D	
161B--------------------- Yellowdog	7s	Not prime farmland	3D	4/Ra	ATD	TM
162B--------------------- Buckroe	7s	Not prime farmland	3D	Ra	ATD	TMV
165B---------------------		Not prime farmland			AVO	ATD
Chocolay----------------	7s		3F	3/Ra		
Waiska------------------	6s		3A	Ga		
166---------------------- Skandia	7w	Not prime farmland	3W	M/Rc	TTS	PO
167----------------------		Not prime farmland		M/Rc	TTS	PO
Skandia-----------------	7w		3W			
Jacobsville-------------	5w		2W			
168B---------------------		Not prime farmland				
Yellowdog---------------	7s		3D	4/Ra	ATD	
Burt--------------------	7w		2W	Rbc	TTS	
170B--------------------- Chocolay	7s	Not prime farmland	3F	3/Ra	AVO	ATD
171B--------------------- Paavola	6s	Not prime farmland	3W	Ga/4a-af	ATD	AVO
172D---------------------		Not prime farmland			ATD	---
Buckroe-----------------	7s		3D	Ra		
Rock outcrop------------	8		---	---		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
172F		Not prime farmland			ATD	---
Buckroe	7s		3R	Ra		
Rock outcrop	8		---	---		
173B Pence	6s	Not prime farmland	3A	4a-a	AQVac	---
173D Pence	7s	Not prime farmland	3A	4a-a	AQVac	---
174D		Not prime farmland			ATD	TMV
Yalmer	3e		3D	4a-af		
Rubicon	6s		4S	5.3a		
Urban land.						
175E		Not prime farmland			ATD-D	---
Kalkaska	7s		3R	5a		
Waiska	6s		3R	Ga		
175F		Not prime farmland			ATD-D	---
Kalkaska	7s		3R	5a		
Waiska	6s		3R	Ga		
176B		Not prime farmland				
Greenwood	7w		2W	Mc-a	PCS	---
Croswell	4s		5S	5a	TMC-V	---
177E Frohling	6e	Not prime farmland	3R	3a-af	ATD	---
177F Frohling	7e	Not prime farmland	3R	3a-af	ATD	---
178D		Not prime farmland				
Schweitzer	7s		3D	3a-af	ATD	---
Kalkaska	6s		3S	5a	ATD-D	---
Rock outcrop	8		---	---		
178F		Not prime farmland				
Schweitzer	7s		3R	3a-af	ATD	---
Kalkaska	7s		3R	5a	ATD-D	---
Rock outcrop	8		---	---		
179E		Not prime farmland			ATD	AVO
Schweitzer	7s		3R	3a-af		
Michigamme	7s		3R	3/Ra		
180E		Not prime farmland			ATD-D	ATD
Kalkaska	7s		3R	5a		
Frohling	6e		3R	3a-af		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type	
					Primary	Secondary
180F		Not prime farmland			ATD-D	ATD
Kalkaska	7s		3R	5a		
Frohling	7e		3R	3a-af		
181E		Not prime farmland			ATD	---
Frohling	7s		3R	3a-af		
Tokiahok	7s		3R	4a-af		
181F		Not prime farmland			ATD	---
Frohling	7s		3R	3a-af		
Tokiahok	7s		3R	4a-af		
184C		Not prime farmland				
Dishno	6s		3X	3a	ATD	---
Witbeck	7s		3X	3c	TMC-D	FI
Rock outcrop	8		---	---		
185B Northland	3s	Not prime farmland	5L	3/5a	TM	AVO
187B Reade	3s	Prime farmland*	3D	3/Ra	AVO	ATD
190B		Not prime farmland			AVO	AVO-A
Emmet	2e		3L	3a		
Cunard	2e		3D	3/Ra		
191B		Not prime farmland				
Nahma	5w		4W	3/Rbc	FI	TTM
Sundell	3w		2W	3/Rbc	AVO-CI	---
193E		Not prime farmland			ATD	---
Frohling	7e		3R	3a-af		
Tokiahok	7e		3R	4a-af		
194E Sporley	6e	Not prime farmland	3R	2.5a	AVO	ATD
196E		Not prime farmland			ATD	TM
Frohling	7e		3R	3a-af		
Onota	7e		3R	3/Ra		
Tokiahok	7e		3R	4a-af		
197B		Prime farmland			AVO	AVO-A
Shoepac	3s		3W	3a		
Trenary	2e		3L	3a		

See footnote at end of table.

Interpretive Groups--Continued

Soil name and map symbol	Land capability	Prime farmland status	Woodland ordination symbol	Michigan soil management group	Habitat type Primary	Habitat type Secondary
198B		Prime farmland*			AVO	AVO-A
Shoepac	3s		3W	3a		
Reade	3s		3D	3/Ra		
199. Udorthents, ash						
200A		Prime farmland*				
Charlevoix	2w		3W	3b	TMC	---
Ensley	5w		3W	3c	FI	---
201B		Not prime farmland				
Sauxhead	7s		3D	Ra	ATD	---
Jacobsville	6s		2W	M/Rc	TTS	FI
202B Sauxhead	7s	Not prime farmland	3D	Ra	ATD	---
203A		Not prime farmland				
Au Gres	4w		6W	5b	TMC	---
Deford	5w		4W	5c	TTS	---
204B		Not prime farmland				
Gogebic	6s		3W	3a-af	ATD	AVO
Tula	7s		3W	3b	TMC	AVO-CI
206B Traunik	6s	Not prime farmland	3L	3/5a	AVO	---
207D		Not prime farmland			ATD	TMV
Dishno	6s		3X	3a		
Michigamme	7s		3X	3/Ra		
Rock outcrop	8		---	---		
208F		Not prime farmland			ATD	TMV
Keewaydin	7s		3R	3/5a		
Michigamme	7s		3R	3/Ra		
209B		Not prime farmland			ATD-D	ATD
Garlic	4s		3S	4a		
Fence	2e		3L	2.5a		
M-W. Miscellaneous water						
W. Water						

* Where drained.

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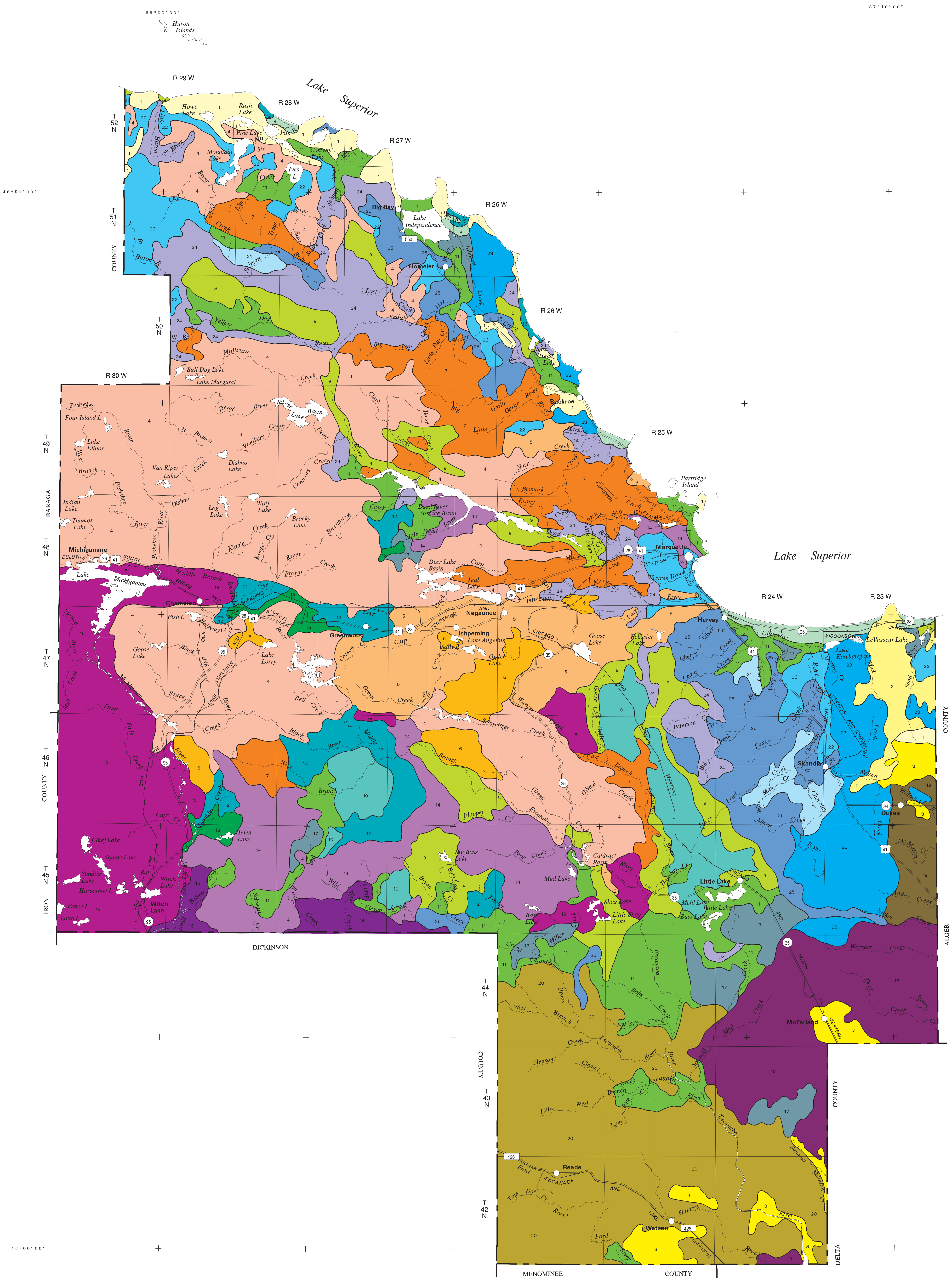


SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

LEGEND

Soils on Bedrock Benches

1 Buckroe-Yalmer Association

2 Zeba-Jacobsville Association

3 Cunard-Nahma Association

Soils and Miscellaneous Areas on Bedrock-Controlled Moraines

4 Keewaydin-Michigamme-Rock Outcrop Association

5 Schweitzer-Michigamme-Rock Outcrop Association

6 Pits-Dumps, Mine-Slickens Association

7 Kalkaska-Ishpeming-Rock Outcrop Association

Soils on Outwash Plains, Terraces, and Beach Ridges

8 Deer Park Association

9 Rubicon-Sayner Association

10 Grayling Association

11 Kalkaska-Carbondale-Deford Association

12 Pence Association

13 Sundog-Minocqua-Channing Association

Soils on Disintegration Moraines

14 Rubicon-Keweenaw Association

15 Goodman-Sundog-Greenwood Association

16 Sagola-Rubicon Association

Soils in Swamps on Lake Plains, Outwash Plains, and Moraines

17 Carbondale-Tawas Association

Soils on Ground Moraines

18 Shoepac-Ensley-Charlevoix Association

19 Shoepac-Carbondale Association

20 Emmet-Carbondale Association

Soils on Till-Floored Lake Plains and Dissected Moraines

21 Munising-Fence-Paquin Association

22 Munising-Yalmer Association

23 Skanee-Munising-Gay Association

24 Keweenaw-Kalkaska-Waiska Association

25 Garlic-Alcona-Voelker Association

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
UNITED STATES FOREST SERVICE
MICHIGAN DEPARTMENT OF AGRICULTURE
MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN STATE UNIVERSITY EXTENSION
MICHIGAN TECHNOLOGICAL UNIVERSITY

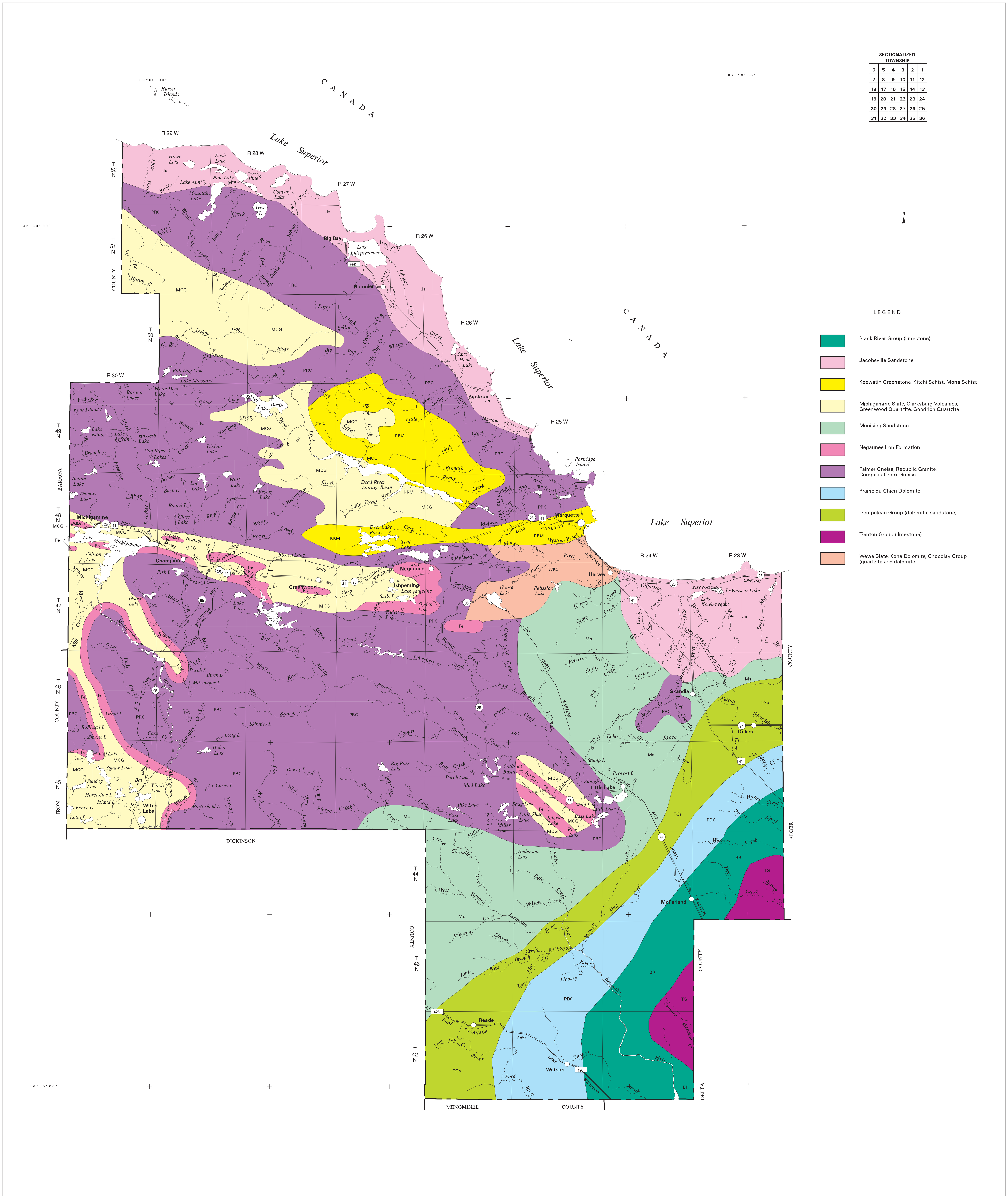
GENERAL SOIL MAP
MARQUETTE COUNTY, MICHIGAN

1 0 1 2 3 MILES

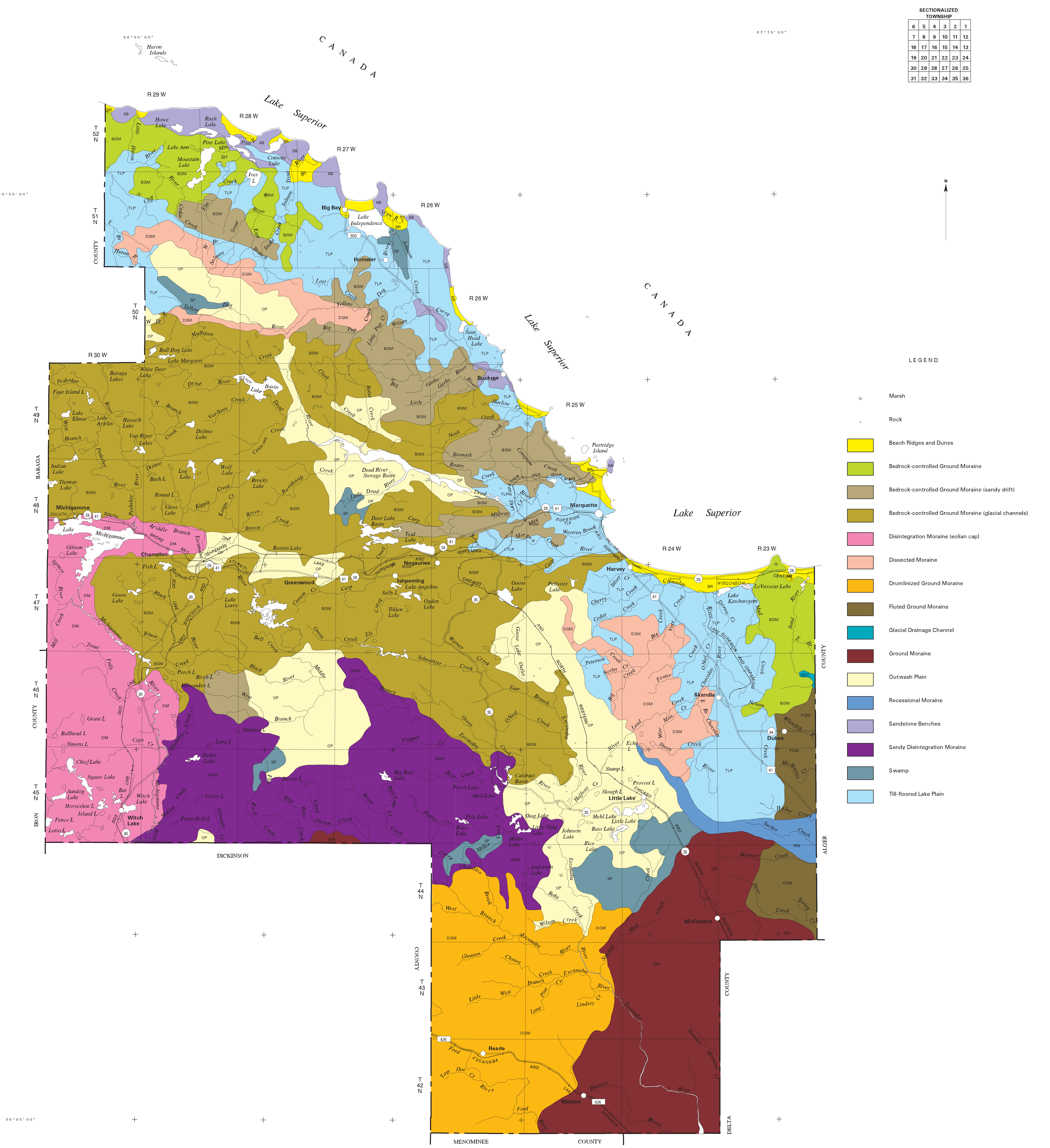
1 0 1 2 3 4 5 6 KILOMETERS

SCALE = 1:205000

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

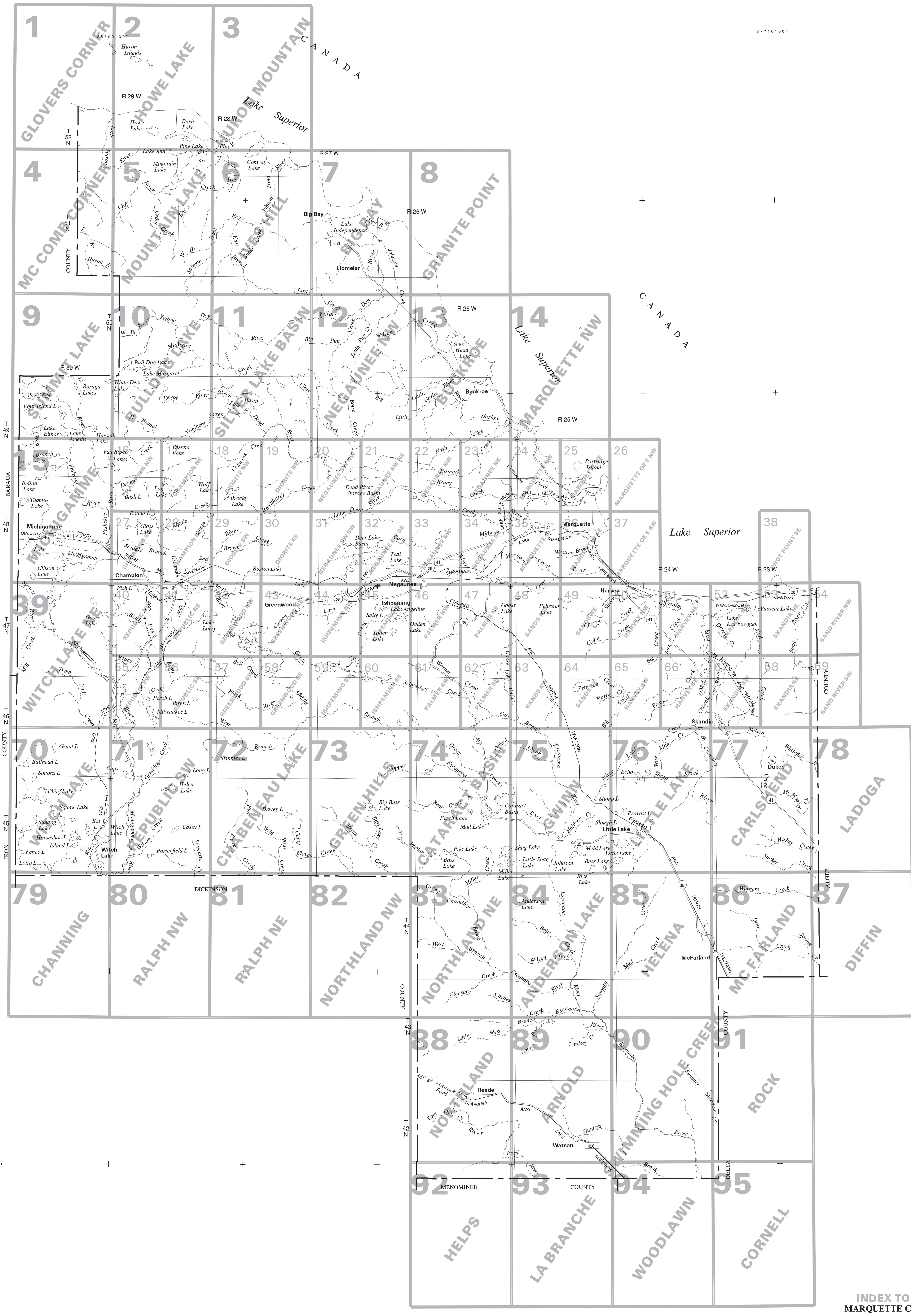


GENERALIZED BEDROCK GEOLOGY MAP
MARQUETTE COUNTY, MICHIGAN



LANDFORM MAP
MARQUETTE COUNTY, MICHIGAN

MILES
KILOMETERS
SCALE = 1:205000



INDEX TO MAP SHEETS
MARQUETTE COUNTY, MICHIGAN

MILES

KILOMETERS

SCALE = 1:205000

SOIL LEGEND

SYMBOL	NAME
10B	Grayling sand, 0 to 6 percent slopes
10D	Grayling sand, 6 to 18 percent slopes
10E	Grayling sand, 18 to 35 percent slopes
11C	Deer Park sand, 1 to 10 percent slopes
11D	Deer Park sand, 6 to 18 percent slopes
12B	Rubicon sand, 0 to 6 percent slopes
12D	Rubicon sand, 6 to 18 percent slopes
12E	Rubicon sand, 18 to 35 percent slopes
12F	Rubicon sand, 35 to 70 percent slopes
13B	Kalkaska sand, 0 to 6 percent slopes
13D	Kalkaska sand, 6 to 18 percent slopes
13E	Kalkaska sand, 18 to 35 percent slopes
13F	Kalkaska sand, 35 to 70 percent slopes
14B	Rousseau fine sand, 0 to 6 percent slopes
14D	Rousseau fine sand, 6 to 18 percent slopes
15A	Croswell sand, 0 to 3 percent slopes
16A	Paquin sand, 0 to 3 percent slopes
17A	Au Gres sand, 0 to 3 percent slopes
18	Kinross mucky peat
19	Deford muck
20B	Rousseau-Ocqueoc fine sands, 0 to 6 percent slopes
20D	Rousseau-Ocqueoc fine sands, 6 to 18 percent slopes
20E	Rousseau-Ocqueoc fine sands, 18 to 35 percent slopes
22B	Alcona loamy very fine sand, 1 to 6 percent slopes
24B	Munising fine sandy loam, 1 to 6 percent slopes
24D	Munising fine sandy loam, 6 to 18 percent slopes
25B	Munising-Yalmer complex, 1 to 6 percent slopes
25D	Munising-Yalmer complex, 6 to 18 percent slopes
26A	Skanee cobbly fine sandy loam, 0 to 3 percent slopes, stony
27	Gay muck, stony
28B	Keweenaw loamy sand, 1 to 6 percent slopes
28D	Keweenaw loamy sand, 6 to 18 percent slopes
28E	Keweenaw loamy sand, 18 to 35 percent slopes
29B	Yalmer fine sand, 1 to 6 percent slopes
29D	Yalmer fine sand, 6 to 18 percent slopes
31D	Trenary silt loam, 6 to 18 percent slopes
32A	Charlevoix silt loam, 0 to 3 percent slopes
33	Ensley muck
34B	Onaway fine sandy loam, 1 to 6 percent slopes
34D	Onaway fine sandy loam, 6 to 18 percent slopes
34E	Onaway fine sandy loam, 18 to 35 percent slopes
35B	Champion cobbly fine sandy loam, 1 to 6 percent slopes, very stony
35D	Champion cobbly fine sandy loam, 6 to 18 percent slopes, very stony
36A	Net cobbly very fine sandy loam, 0 to 3 percent slopes, very stony
37	Witbeck very stony muck, extremely bouldery
38B	Pence fine sandy loam, 0 to 6 percent slopes
38D	Pence fine sandy loam, 6 to 18 percent slopes
38E	Pence fine sandy loam, 18 to 35 percent slopes
39B	Amasa very fine sandy loam, 1 to 6 percent slopes
39D	Amasa very fine sandy loam, 6 to 18 percent slopes
39E	Amasa very fine sandy loam, 18 to 35 percent slopes
40B	Waiska cobbly loamy sand, 0 to 6 percent slopes
40D	Waiska cobbly loamy sand, 6 to 18 percent slopes
41A	Channing fine sandy loam, 0 to 3 percent slopes
42	Minocqua muck
43B	Karlin sandy loam, 1 to 6 percent slopes
43D	Karlin sandy loam, 6 to 18 percent slopes
44B	Carlshend fine sandy loam, 1 to 6 percent slopes, stony
45A	Zeba cobbly fine sandy loam, 0 to 3 percent slopes, very stony
46	Jacobsville muck, very stony
48	Burt muck
50A	Sundell loam, 0 to 3 percent slopes
51	Nahma muck
52B	Summerville fine sandy loam, 1 to 6 percent slopes

SYMBOL	NAME
55F	Michigamme-Rock outcrop complex, 25 to 70 percent slopes, very bouldery
56D	Peshekee-Rock outcrop complex, 6 to 18 percent slopes, very bouldery
56E	Peshekee-Rock outcrop complex, 18 to 35 percent slopes, very bouldery
56F	Peshekee-Rock outcrop complex, 35 to 70 percent slopes, very bouldery
57	Carbondale and Tawas soils
58	Greenwood and Dawson soils
59	Chippeny and Nahma mucks
60	Histosols and Aquents, ponded
61	Pits, borrow
62B	Udorthents and Udipsamments, nearly level and gently sloping
64	Pits and Dumps, mine
65B	Udorthents-Urban land complex, nearly level and gently sloping
66B	Udipsamments-Urban land complex, nearly level and gently sloping
67B	Urban land-Rubicon complex, 0 to 6 percent slopes
68	Pits, quarries
69B	Escanaba loamy fine sand, 1 to 6 percent slopes
69D	Escanaba loamy fine sand, 6 to 18 percent slopes
70B	Nadeau fine sandy loam, 1 to 6 percent slopes
70D	Nadeau fine sandy loam, 6 to 18 percent slopes
71B	Evart-Pelkie-Sturgeon complex, 0 to 4 percent slopes
72B	Emmet fine sandy loam, 1 to 6 percent slopes
72D	Emmet fine sandy loam, 6 to 18 percent slopes
72E	Emmet fine sandy loam, 18 to 35 percent slopes
73B	Gogebic cobbly silt loam, 1 to 6 percent slopes, very stony
73D	Gogebic cobbly silt loam, 6 to 18 percent slopes, very stony
74D	Schweitzer-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very stony
74F	Schweitzer-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very stony
76C	Garlic-Alcona-Voelker complex, 1 to 12 percent slopes, dissected
76E	Garlic-Alcona-Voelker complex, 8 to 35 percent slopes, dissected
76F	Garlic-Alcona-Voelker complex, 15 to 70 percent slopes, dissected
77D	Garlic-Alcona-Voelker complex, 6 to 18 percent slopes
77E	Garlic-Alcona-Voelker complex, 18 to 35 percent slopes
78C	Keweenaw-Kalkaska complex, 1 to 12 percent slopes, dissected
78E	Keweenaw-Kalkaska complex, 8 to 35 percent slopes, dissected
78F	Keweenaw-Kalkaska complex, 15 to 60 percent slopes, dissected
79B	Keweenaw-Munising complex, 1 to 6 percent slopes
80B	Sayner-Rubicon complex, 1 to 6 percent slopes
80D	Sayner-Rubicon complex, 6 to 18 percent slopes
80E	Sayner-Rubicon complex, 18 to 35 percent slopes
81B	Pelissier gravelly sandy loam, 1 to 6 percent slopes
81D	Pelissier gravelly sandy loam, 6 to 18 percent slopes
81E	Pelissier gravelly sandy loam, 18 to 35 percent slopes
84D	Rubicon-Ishpeming-Rock outcrop complex, 6 to 25 percent slopes
84F	Rubicon-Ishpeming-Rock outcrop complex, 25 to 60 percent slopes
85A	Solona fine sandy loam, 0 to 3 percent slopes
86B	Mashek fine sandy loam, 0 to 4 percent slopes
87B	Cunard fine sandy loam, 1 to 6 percent slopes
88	Cathro-Ensley mucks
89B	Emmet-Solona fine sandy loams, 0 to 6 percent slopes
90B	Emmet-Escanaba complex, 1 to 6 percent slopes
90D	Emmet-Escanaba complex, 6 to 18 percent slopes
91B	Onaway-Nadeau fine sandy loams, 1 to 6 percent slopes
92A	Ensley-Solona complex, 0 to 3 percent slopes
93	Tawas-Deford mucks
94B	Keweenaw-Kalkaska complex, 1 to 6 percent slopes
94D	Keweenaw-Kalkaska complex, 6 to 18 percent slopes
94E	Keweenaw-Kalkaska complex, 18 to 35 percent slopes
95B	Liminga fine sand, 1 to 6 percent slopes
95D	Liminga fine sand, 6 to 18 percent slopes
100E	Sayner-Rubicon complex, 8 to 35 percent slopes, dissected
100F	Sayner-Rubicon complex, 15 to 60 percent slopes, dissected
103D	Rubicon-Ocqueoc-Rock outcrop complex, 6 to 25 percent slopes
104C	Fence very fine sandy loam, 1 to 12 percent slopes, dissected
105C	Munising fine sandy loam, 1 to 12 percent slopes, dissected

SYMBOL	NAME
106B	Sagola-Rubicon complex, 1 to 6 percent slopes, bouldery
106D	Sagola-Rubicon complex, 6 to 18 percent slopes, bouldery
107B	Goodman-Sundog silt loams, 1 to 6 percent slopes, bouldery
107D	Goodman-Sundog silt loams, 6 to 18 percent slopes, bouldery
107F	Goodman-Sundog silt loams, 18 to 45 percent slopes, bouldery
108B	Goodman-Sundog-Wabeno silt loams, 1 to 6 percent slopes, bouldery
108D	Goodman-Sundog-Wabeno silt loams, 6 to 18 percent slopes, bouldery
109B	Rubicon-Keweenaw complex, 1 to 6 percent slopes, very bouldery
109D	Rubicon-Keweenaw complex, 6 to 18 percent slopes, very bouldery
109F	Rubicon-Keweenaw complex, 18 to 45 percent slopes, very bouldery
110B	Nadeau-Mancelona complex, 1 to 6 percent slopes
110D	Nadeau-Mancelona complex, 6 to 18 percent slopes
111B	Grayling sand, 0 to 4 percent slopes, rocky
112D	Keewaydin-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
112F	Keewaydin-Michigamme-Rock outcrop complex, 25 to 60 percent slopes, very bouldery
113B	Vanriper very cobbly silt loam, 1 to 6 percent slopes, rocky, very bouldery
113D	Vanriper very cobbly silt loam, 6 to 18 percent slopes, rocky, very bouldery
113F	Vanriper very cobbly silt loam, 18 to 45 percent slopes, rocky, very bouldery
114B	Vanriper very cobbly silt loam, 1 to 6 percent slopes, very bouldery
114D	Vanriper very cobbly silt loam, 6 to 18 percent slopes, very bouldery
114F	Vanriper very cobbly silt loam, 18 to 45 percent slopes, very bouldery
117B	Fence very fine sandy loam, 1 to 6 percent slopes
118A	Croswell-Deford complex, 0 to 3 percent slopes
119B	Yalmer-Kalkaska complex, 1 to 6 percent slopes
119D	Yalmer-Kalkaska complex, 6 to 18 percent slopes
121B	Onota gravelly sandy loam, 1 to 6 percent slopes
122	Pleine very cobbly muck, very stony
123A	Tula cobbly very fine sandy loam, 0 to 3 percent slopes, very stony
124B	Gogebic-Dishno cobbly silt loams, 1 to 6 percent slopes, rocky, very stony
124D	Gogebic-Dishno cobbly silt loams, 6 to 18 percent slopes, rocky, very stony
125D	Keweenaw-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
125F	Keweenaw-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very bouldery
126B	Sundog silt loam, 1 to 6 percent slopes
126D	Sundog silt loam, 6 to 18 percent slopes
126E	Sundog silt loam, 18 to 35 percent slopes
127B	Sundog silt loam, 1 to 6 percent slopes, bouldery
127D	Sundog silt loam, 6 to 18 percent slopes, bouldery
127F	Sundog silt loam, 18 to 45 percent slopes, bouldery
128B	Kalkaska-Waiska complex, 1 to 6 percent slopes
128D	Kalkaska-Waiska complex, 6 to 18 percent slopes
128E	Kalkaska-Waiska complex, 18 to 35 percent slopes
129C	Kalkaska-Munising complex, 1 to 12 percent slopes, dissected
130A	Chabeneau silt loam, 0 to 3 percent slopes
131	Witbeck-Cathro complex, very bouldery
132	Slickens
133B	Keewaydin-Dishno complex, 1 to 6 percent slopes, rocky, bouldery
133D	Keewaydin-Dishno complex, 6 to 18 percent slopes, rocky, bouldery
134B	Keewaydin cobbly fine sandy loam, 1 to 6 percent slopes, bouldery
134D	Keewaydin cobbly fine sandy loam, 6 to 18 percent slopes, bouldery
134F	Keewaydin cobbly fine sandy loam, 18 to 45 percent slopes, bouldery
135A	Witbeck-Net complex, 0 to 3 percent slopes, extremely bouldery
136A	Minocqua-Channing complex, 0 to 3 percent slopes
137D	Keewaydin-Sundog complex, 6 to 18 percent slopes, very bouldery
137F	Keewaydin-Sundog complex, 18 to 45 percent slopes, very bouldery
138D	Sundog-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
138F	Sundog-Rock outcrop complex, 25 to 70 percent slopes, very bouldery
139B	Sundog silt loam, 1 to 6 percent slopes, rocky, bouldery
139D	Sundog silt loam, 6 to 18 percent slopes, rocky, bouldery
140B	Champion-Dishno complex, 1 to 6 percent slopes, rocky, very stony
140D	Champion-Dishno complex, 6 to 18 percent slopes, rocky, very stony
141D	Pelissier-Rock outcrop complex, 6 to 25 percent slopes
142B	Pelissier gravelly sandy loam, 1 to 6 percent slopes, rocky
142D	Pelissier gravelly sandy loam, 6 to 18 percent slopes, rocky
144B	Farquar gravelly sandy loam, 0 to 4 percent slopes

SYMBOL	NAME
145C	Munising-Yalmer complex, 1 to 12 percent slopes, dissected, very stony
146B	Munising-Skanee complex, 0 to 6 percent slopes, stony
147A	Skanee-Gay complex, 0 to 3 percent slopes, very stony
148B	Shoepac-Ensley complex, 0 to 6 percent slopes
149	Evart-Cathro complex
150	Shag muck
151A	Spear very fine sandy loam, 0 to 3 percent slopes
153D	Ishpeming-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
153F	Ishpeming-Rock outcrop complex, 25 to 70 percent slopes, very bouldery
154B	Rubicon-Sayner complex, 1 to 6 percent slopes, rocky
154D	Rubicon-Sayner complex, 6 to 18 percent slopes, rocky
155A	Zeba-Jacobsville complex, 0 to 3 percent slopes, very stony
156B	Duel loamy sand, 1 to 6 percent slopes, very stony
157B	Reade-Nahma complex, 0 to 6 percent slopes, stony
158C	Munising-Onota-Yalmer complex, 1 to 12 percent slopes, dissected, stony
159A	Jeske sand, 0 to 3 percent slopes
160B	Paquin-Finch sands, 0 to 5 percent slopes
161B	Yellowdog very channery sand, 0 to 6 percent slopes, stony
162B	Buckroe very channery loamy sand, 0 to 6 percent slopes, stony
165B	Chocolay-Waiska complex, 1 to 6 percent slopes, stony
166	Skandia mucky peat
167	Skandia-Jacobsville complex, stony
168B	Yellowdog-Burt complex, 0 to 6 percent slopes
170B	Chocolay very cobbly fine sandy loam, 1 to 6 percent slopes, very stony
171B	Paavola very gravelly loamy sand, 1 to 6 percent slopes, stony
172D	Buckroe-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
172F	Buckroe-Rock outcrop complex, 25 to 70 percent slopes, very bouldery
173B	Pence fine sandy loam, 1 to 6 percent slopes, rocky, bouldery
173D	Pence fine sandy loam, 6 to 18 percent slopes, rocky, bouldery
174D	Yalmer-Rubicon-Urban land complex, 4 to 18 percent slopes
175E	Kalkaska-Waiska complex, 8 to 35 percent slopes, dissected
175F	Kalkaska-Waiska complex, 15 to 70 percent slopes, dissected
176B	Greenwood-Croswell complex, 0 to 6 percent slopes
177E	Frohling fine sandy loam, 8 to 35 percent slopes, dissected
177F	Frohling fine sandy loam, 15 to 70 percent slopes, dissected
178D	Schweitzer-Kalkaska-Rock outcrop complex, 6 to 25 percent slopes, very stony
178F	Schweitzer-Kalkaska-Rock outcrop complex, 25 to 70 percent slopes, very stony
179E	Schweitzer-Michigamme complex, 18 to 35 percent slopes, rocky, very stony
180E	Kalkaska-Frohling complex, 8 to 35 percent slopes, dissected
180F	Kalkaska-Frohling complex, 15 to 70 percent slopes, dissected
181E	Frohling-Tokiahok complex, 8 to 35 percent slopes, dissected, very stony
181F	Frohling-Tokiahok complex, 15 to 70 percent slopes, dissected, very stony
184C	Dishno-Witbeck-Rock outcrop complex, 0 to 12 percent slopes, very bouldery
185B	Northland loamy fine sand, 0 to 4 percent slopes
187B	Reade silt loam, 0 to 4 percent slopes
190B	Emmet-Cunard fine sandy loams, 1 to 6 percent slopes, stony
191B	Nahma-Sundell complex, 0 to 4 percent slopes
193E	Frohling-Tokiahok complex, 18 to 35 percent slopes
194E	Sporley silt loam, 8 to 35 percent slopes, dissected
196E	Frohling-Onota-Tokiahok complex, 8 to 35 percent slopes, dissected, stony
197B	Shoepac-Trenary silt loams, 1 to 6 percent slopes
198B	Shoepac-Reade silt loams, 1 to 4 percent slopes
199	Udorthents, ash
200A	Charlevoix-Ensley complex, bedrock substratum, 0 to 3 percent slopes
201B	Sauxhead-Jacobsville complex, 0 to 6 percent slopes, very stony
202B	Sauxhead sandy loam, 1 to 6 percent slopes, very stony
203A	Au Gres-Deford complex, 0 to 3 percent slopes
204B	Gogebic-Tula complex, 1 to 6 percent slopes, very stony
206B	Traunik gravelly fine sandy loam, 1 to 6 percent slopes
207D	Dishno-Michigamme-Rock outcrop complex, 6 to 25 percent slopes, very bouldery
208F	Keewaydin-Michigamme cobbly fine sandy loams, 18 to 45 percent slopes, rocky, very bouldery
209B	Garlic-Fence complex, 1 to 6 percent slopes
M-W	Miscellaneous water
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park)
- Land grant
- Limit of soil survey (label) and/or denied access area
- Field sheet matchline & neatline
- Previously Published Survey

OTHER BOUNDARY (label)

- Airport, airfield
- Cemetery
- City/county park

STATE COORDINATE TICK
1 890 000 FEET

LAND DIVISION CORNER
(section and land grants)

GEOGRAPHIC COORDINATE TICK

TRANSPORTATION

- Divided roads
- Other roads
- Trail

ROAD EMBLEM AND DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE

PIPELINE

FENCE

LEVEES

- Without road
- With road
- With railroad
- Single side slope (showing actual feature location)

DAMS

- Medium or Small

LANDFORM FEATURES

- Prominent hill or peak
- Soil Sample Site

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house
- Church
- School
- Other Religion
- Located object
- Tank
- Lookout Tower
- Oil and/or Natural Gas Wells
- Windmill
- Lighthouse

HYDROGRAPHIC FEATURES

STREAMS

- Perennial stream, double line
- Perennial stream, single line
- Intermittent stream
- Drainage end

DRAINAGE AND IRRIGATION

- Double-line canal (label)
- Perennial drainage and/or irrigation ditch
- Intermittent drainage and/or irrigation ditch

SMALL LAKES, PONDS AND RESERVOIRS

- Perennial water
- Miscellaneous water
- Flood pool line

MISCELLANEOUS WATER FEATURES

- Spring
- Well, artesian
- Well, irrigation

SPECIAL SYMBOLS FOR SOIL SURVEY AND SSURGO

SOIL DELINEATIONS AND SYMBOLS

LANDFORM FEATURES

- Bedrock escarpment
- Other than bedrock escarpment
- Short steep slope
- Gully
- Depression, closed
- Sinkhole

PITS

- Borrow pits
- Gravel pit
- Mine or quarry
- Landfill

MISCELLANEOUS SURFACE FEATURES

- Blowout
- Clay spot
- Gravelly spot
- Lava flow
- Marsh or swamp
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip
- Sodic spot
- Spoil area
- Stony spot
- Very stony spot
- Wet spot

AD HOC FEATURES

- Filled area
- Loamy spot
- Mine shaft
- Moderately deep bedrock
- Muck spot
- Typical pedon location
- Well drained area

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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 (ALL WATER)
2 (ALL WATER)
3 (ALL WATER)
4 SKANEE NORTH (BARAGA COUNTY)
5 HOWE LAKE (SHEET 2)
6 SKANEE SOUTH (BARAGA COUNTY)
7 MCCOMB CORNER (SHEET 4)
8 MOUNTAIN LAKE (SHEET 5)

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3 (ALL WATER)
4 GLOVERS CORNER (SHEET 1)
5 HURON MOUNTAIN (SHEET 3)
6 MCCOMB CORNER (SHEET 4)
7 MOUNTAIN LAKE (SHEET 5)
8 IVES HILL (SHEET 6)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
HURON MOUNTAIN QUADRANGLE
SHEET NUMBER 3 OF 95

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NORTH

QUADRANGLE LOCATION

MILES

FEET

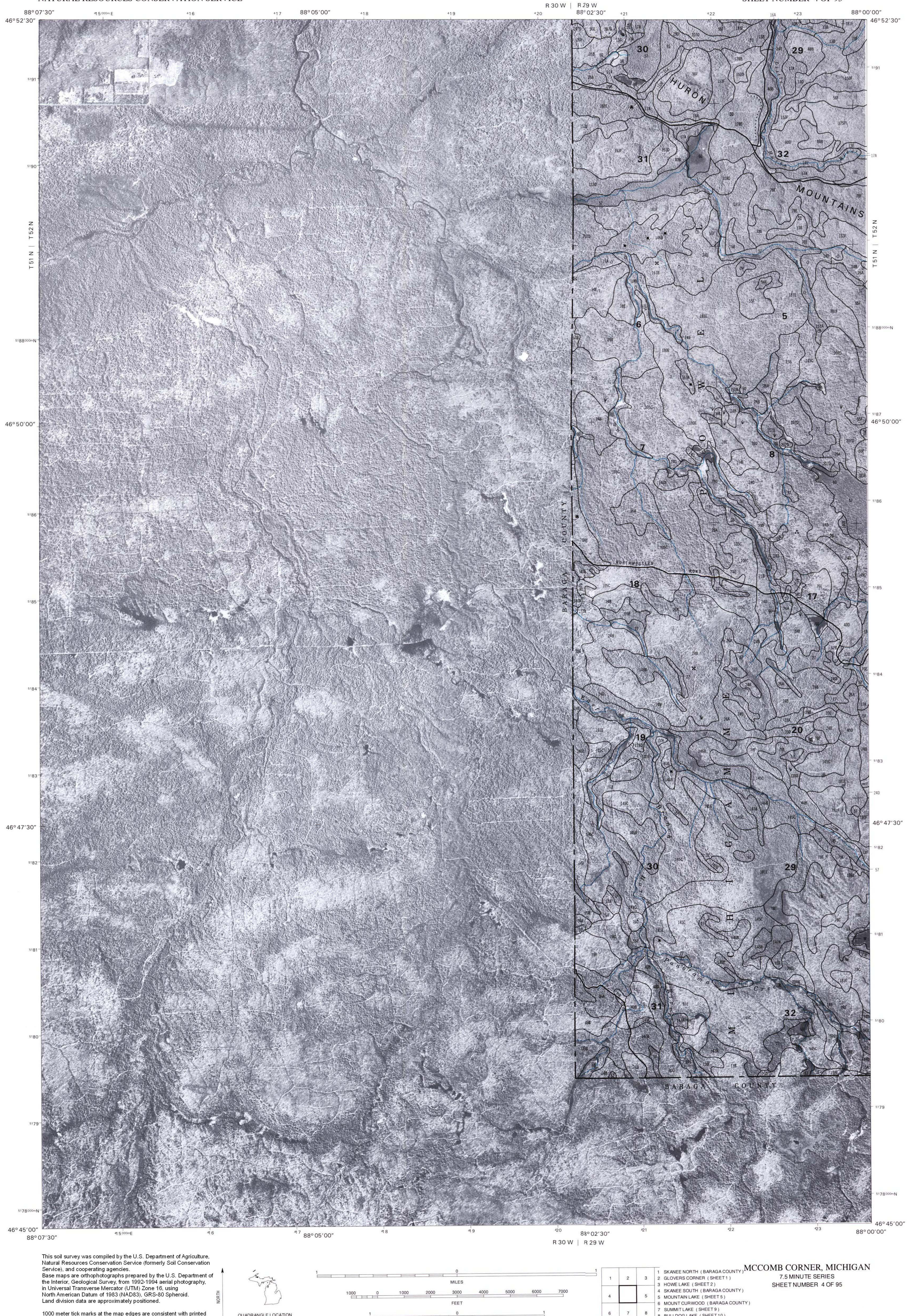
KILOMETERS

1 (ALL WATER)
2 (ALL WATER)
3 (ALL WATER)
4 HOWE LAKE (SHEET 2)
5 (ALL WATER)
6 MOUNTAIN LAKE (SHEET 5)
7 IVES HILL (SHEET 6)
8 BIG BAY (SHEET 7)

INDEX TO ADJOINING 7.5 MAPS

HURON MOUNTAIN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 3 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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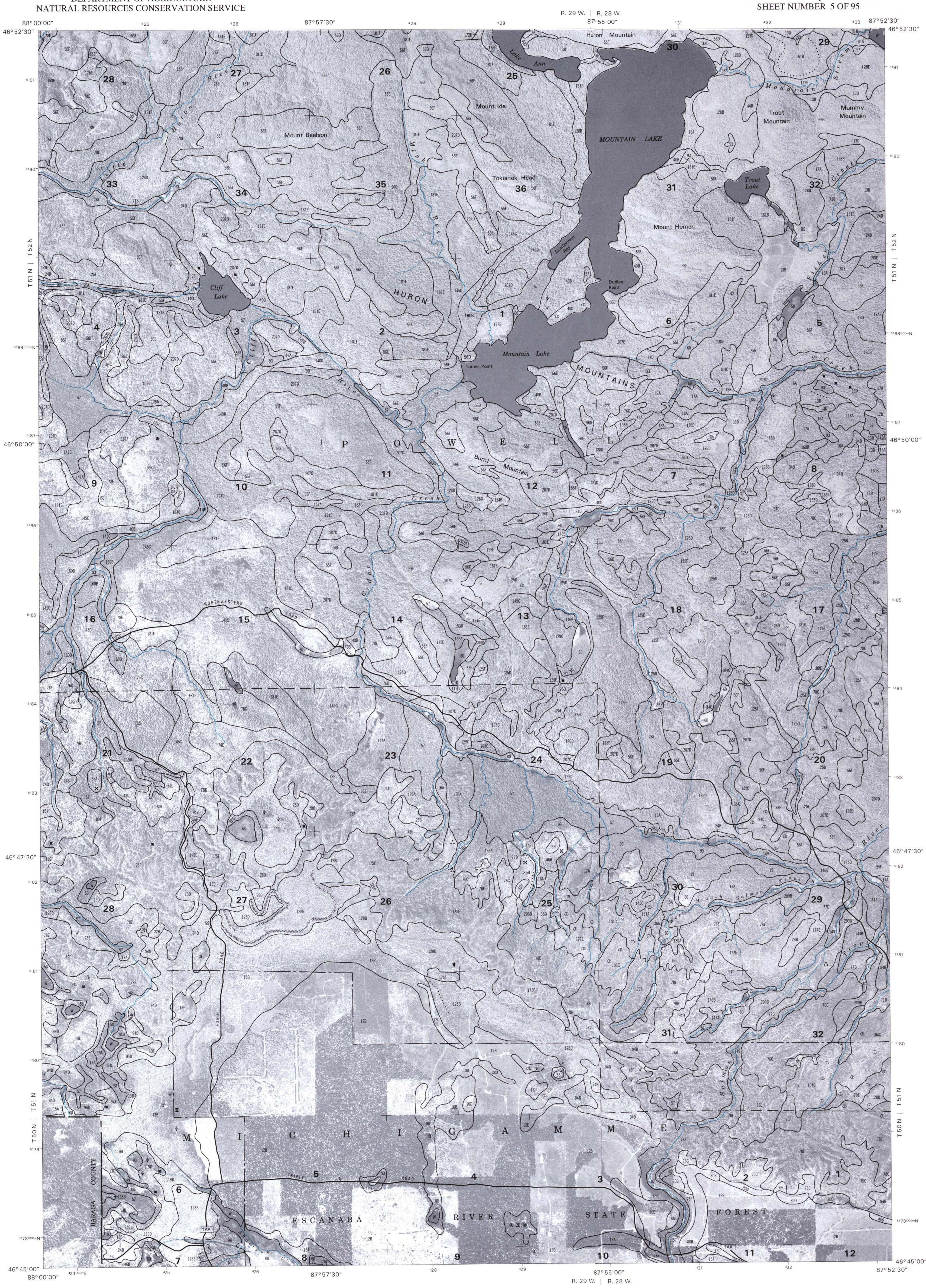
Digital data are available for this quadrangle.

1	2	3
4		5
6	7	8

1 SKANEE NORTH (BARAGA COUNTY)
2 GLOVERS CORNER (SHEET 1)
3 HOWE LAKE (SHEET 2)
4 SKANEE SOUTH (BARAGA COUNTY)
5 MOUNTAIN LAKE (SHEET 5)
6 MOUNT CURWOOD (BARAGA COUNTY)
7 SUMMIT LAKE (SHEET 9)
8 BULLDOG LAKE (SHEET 10)

INDEX TO ADJOINING 7.5 MAPS



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NORTH

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MILES

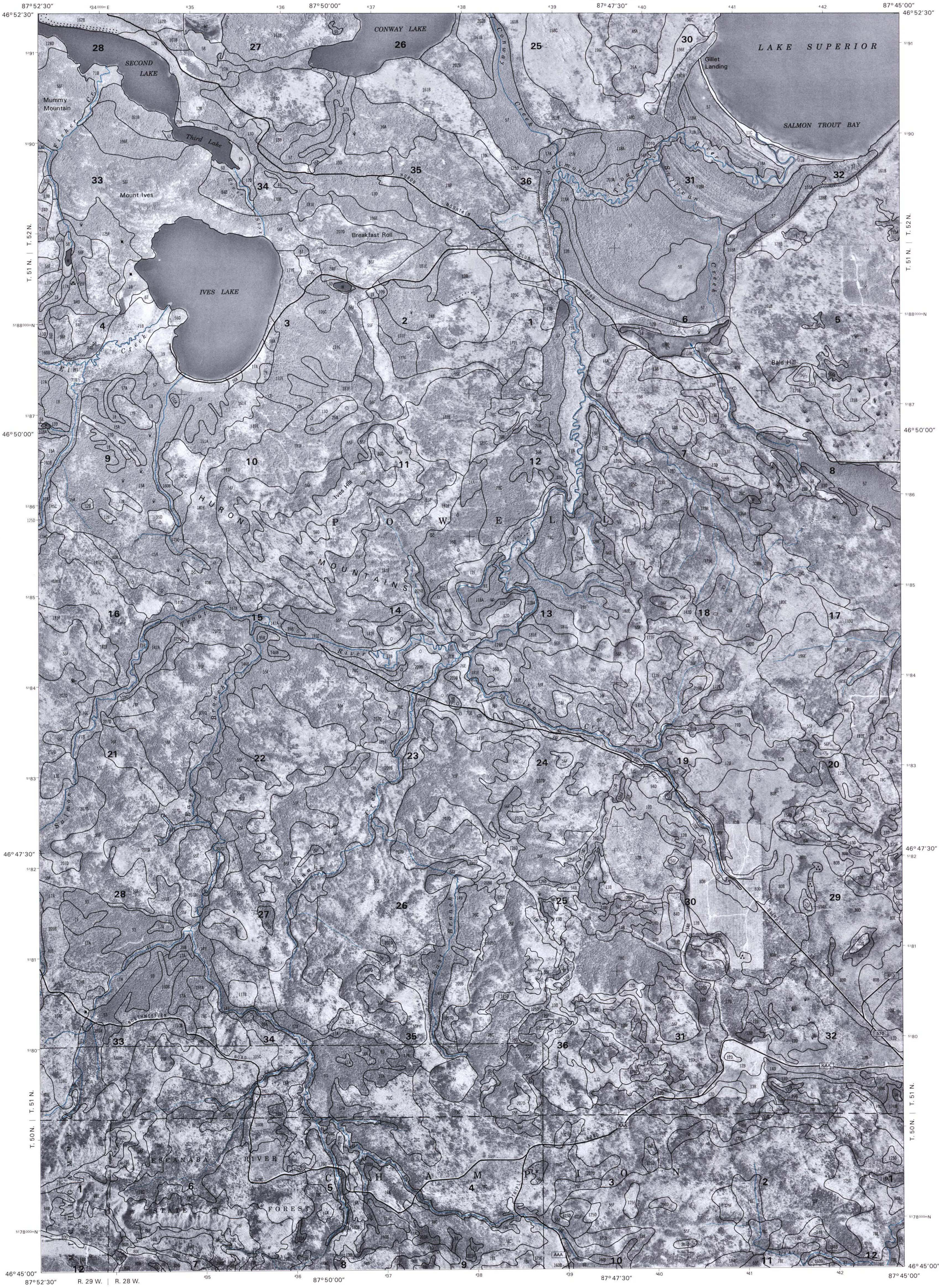
FEET

KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 GLOVERS CORNER (SHEET 1)
2 HOWE LAKE (SHEET 2)
3 HURON MOUNTAIN (SHEET 3)
4 MCCOMB CORNER (SHEET 4)
5 IVES HILL (SHEET 6)
6 SUMMIT LAKE (SHEET 9)
7 BULLDOG LAKE (SHEET 10)
8 SILVER LAKE BASIN (SHEET 11)

MOUNTAIN LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 5 OF 95



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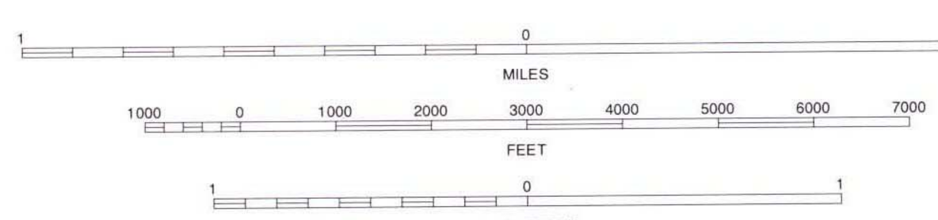


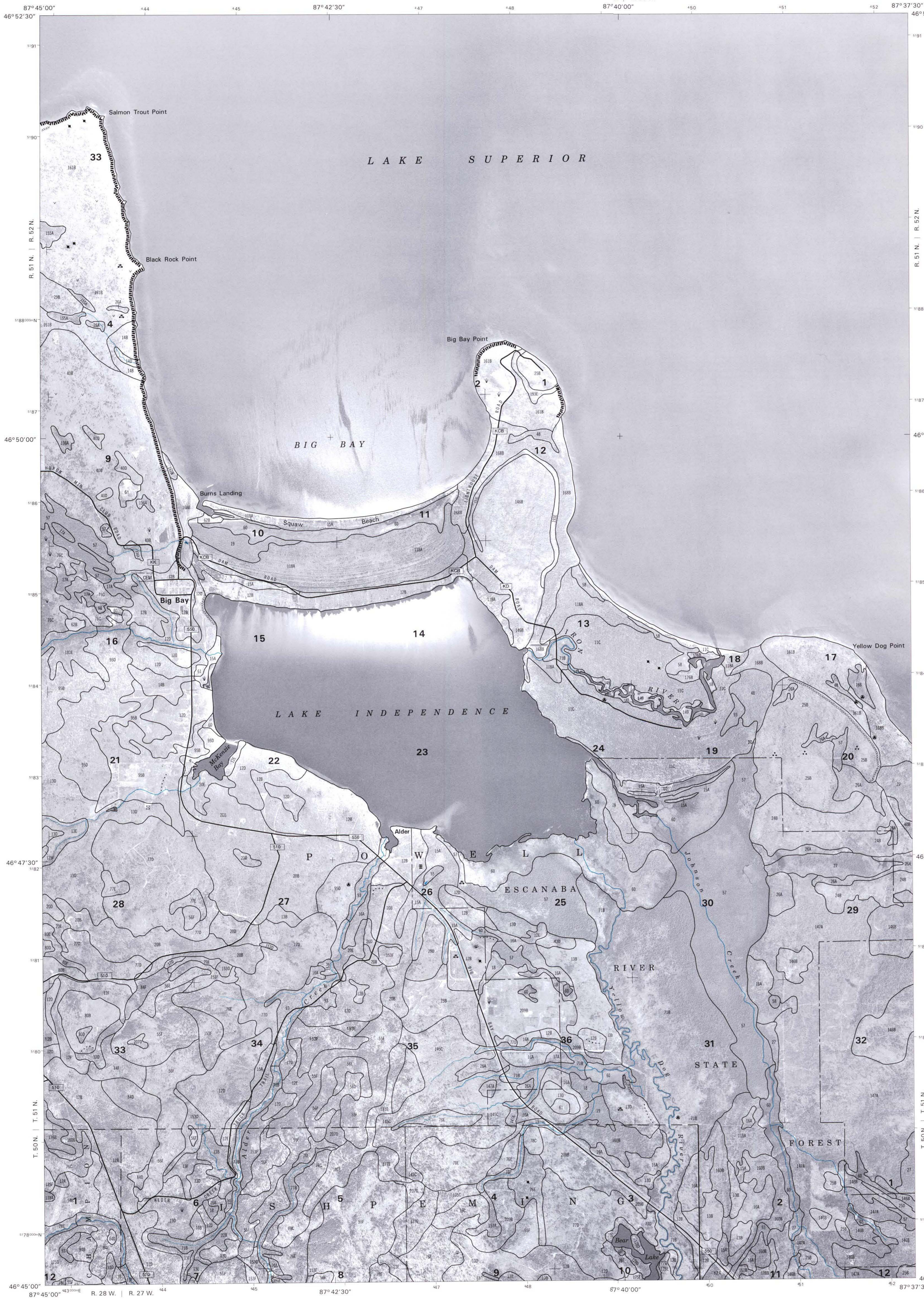
INDEX TO ADJOINING 7.5 MAPS

1 HOWE LAKE (SHEET 2)
2 HURON MOUNTAIN (SHEET 3)
3 (ALL WATER)
4 MOUNTAIN LAKE (SHEET 5)
5 BIG BAY (SHEET 7)
6 BULLDOG LAKE (SHEET 10)
7 SILVER LAKE BASIN (SHEET 11)
8 NEGAUNEE NW (SHEET 12)

IVES HILL, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 6 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
BIG BAY QUADRANGLE



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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

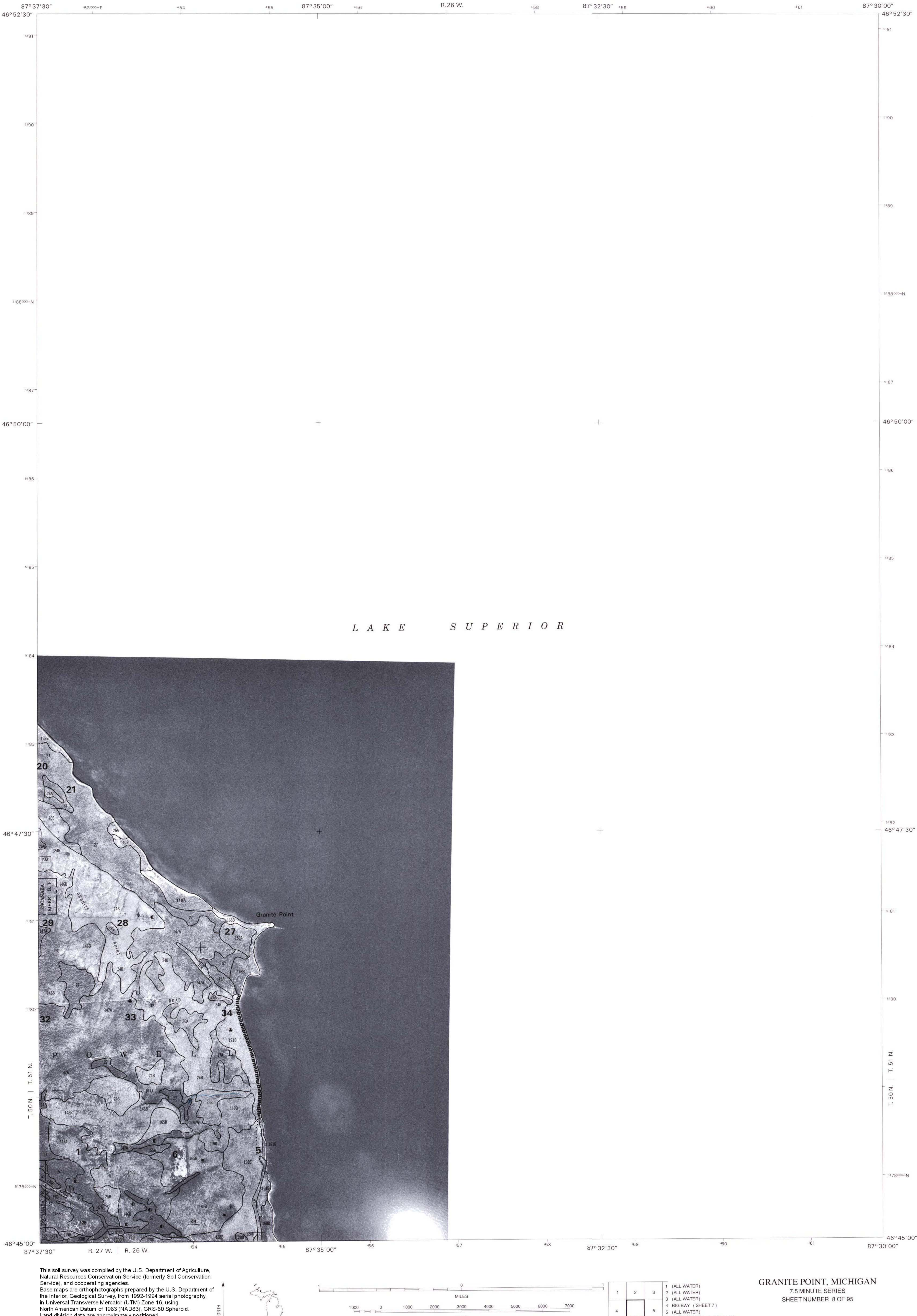
INDEX TO ADJOINING 7.5 MAPS

1 HURON MOUNTAIN (SHEET 3)
2 (ALL WATER)
3 (ALL WATER)
4 IVES HILL (SHEET 6)
5 GRANITE POINT (SHEET 8)
6 SILVER LAKE BASIN (SHEET 11)
7 NEGAUNEE NW (SHEET 12)
8 BUCKROE (SHEET 13)

BIG BAY, MICHIGAN
7.5 MINUTE SERIES

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
GRANITE POINT QUADRANGLE
SHEET NUMBER 8 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

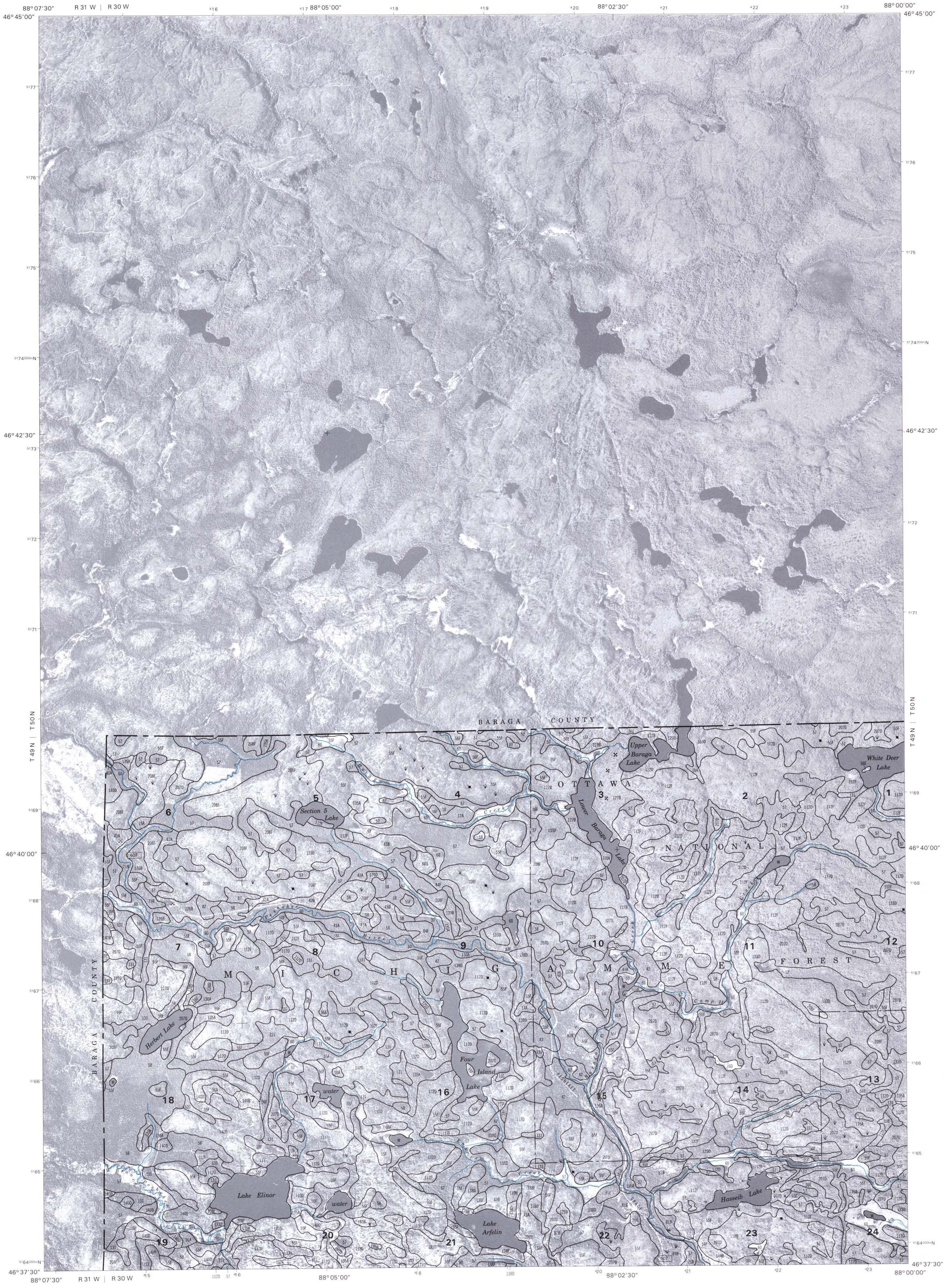
KILOMETERS

1	2	3
4		5
6	7	8

1 (ALL WATER)
2 (ALL WATER)
3 (ALL WATER)
4 BIG BAY (SHEET 7)
5 (ALL WATER)
6 NEGAUNEE NW (SHEET 12)
7 BUCKROE (SHEET 13)
8 MARQUETTE NW (SHEET 14)

INDEX TO ADJOINING 7.5 MAPS

GRANITE POINT, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 8 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

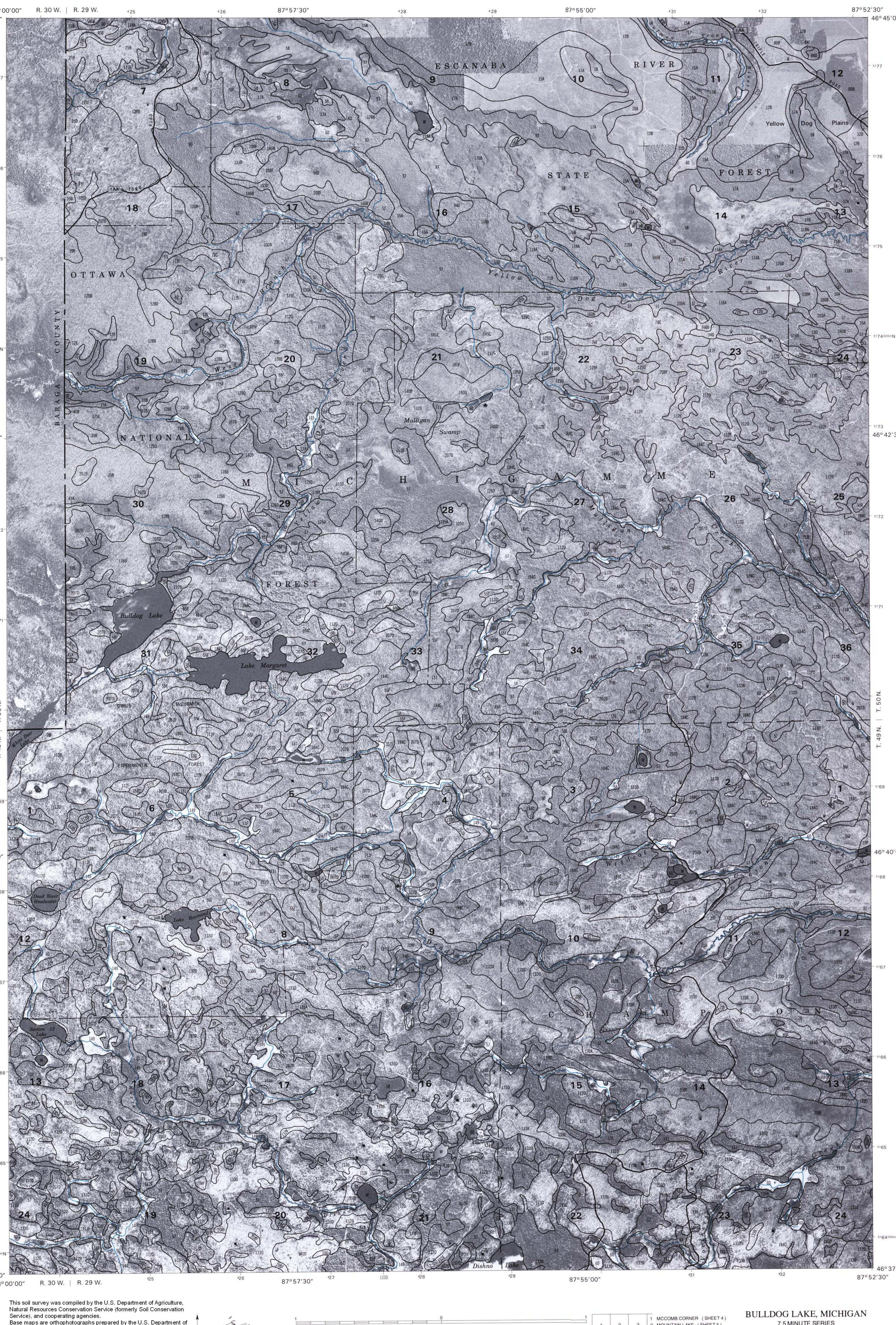
1 SKANEE SOUTH (BARAGA COUNTY)
2 MCCOMB CORNER (SHEET 4)
3 MOUNTAIN LAKE (SHEET 5)
4 MOUNT CURWOOD (BARAGA COUNTY)
5 BULLDOG LAKE (SHEET 10)
6 THREE LAKES (BARAGA COUNTY)
7 MICHIGAMME (SHEET 15)
8 CHAMPION (SHEETS 16 AND 17)

INDEX TO ADJOINING 7.5 MAPS

SUMMIT LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 9 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
BULLDOG LAKE QUADRANGLE
SHEET NUMBER 10 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 MCCOMB CORNER (SHEET 4)
2 MOUNTAIN LAKE (SHEET 5)
3 IVES HILL (SHEET 6)
4 SUMMIT LAKE (SHEET 9)
5 SILVER LAKE BASIN (SHEET 11)
6 MICHIGAMME (SHEET 15)
7 CHAMPION (SHEETS 16 AND 17)
8 DIORITE (SHEET 18)

INDEX TO ADJOINING 7.5 MAPS

BULLDOG LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 10 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SILVER LAKE BASIN QUADRANGLE
SHEET NUMBER 11 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

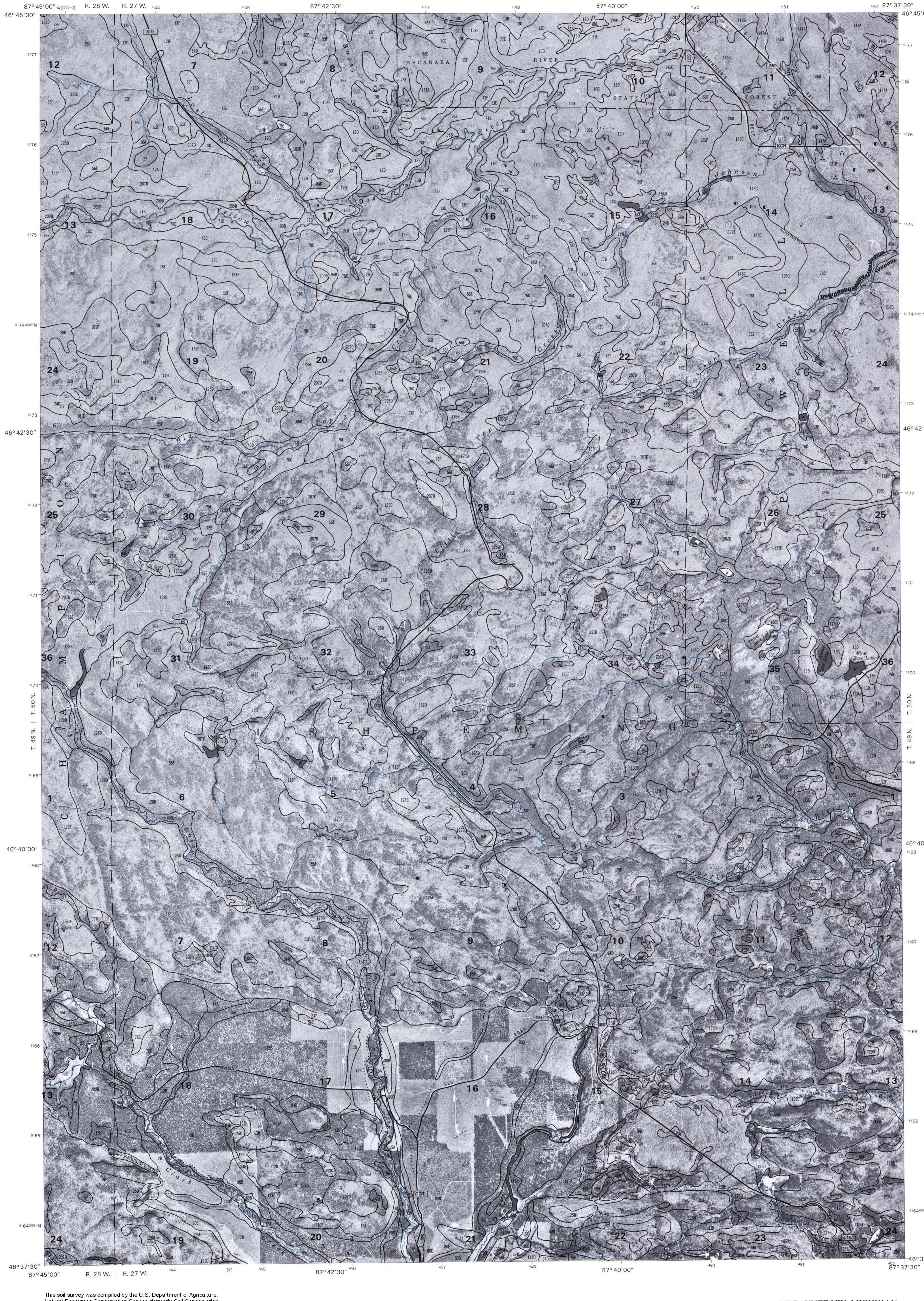
1 MOUNTAIN LAKE (SHEET 5)
2 IVES HILL (SHEET 6)
3 BIG BAY (SHEET 7)
4 BULLDOG LAKE (SHEET 10)
5 NEGAUNEE NW (SHEET 12)
6 CHAMPION (SHEET 17)
7 DIORITE (SHEETS 18 AND 19)
8 NEGAUNEE SW (SHEET 20)

INDEX TO ADJOINING 7.5 MAPS

SILVER LAKE BASIN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 11 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NEGAUNEE NW QUADRANGLE
SHEET NUMBER 12 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

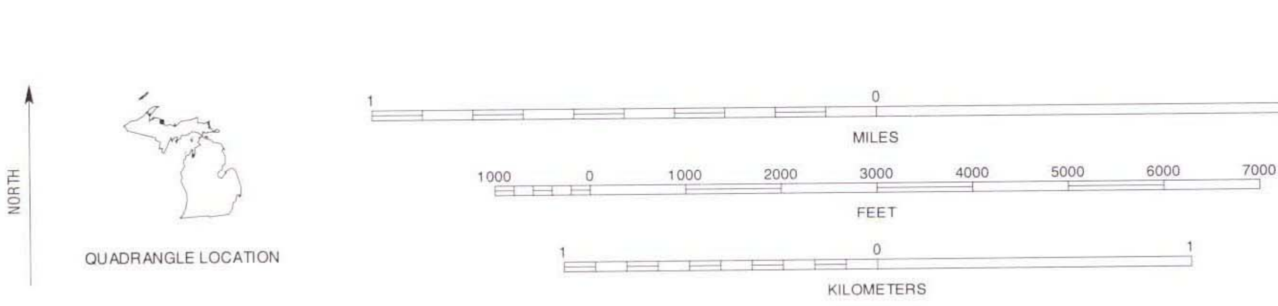
KILOMETERS

1 IVES HILL (SHEET 6)
2 BIG BAY (SHEET 7)
3 GRANITE POINT (SHEET 8)
4 SILVER LAKE BASIN (SHEET 11)
5 BUCKROE (SHEET 13)
6 DIORITE (SHEET 19)
7 NEGAUNEE SW (SHEETS 20 AND 21)
8 NEGAUNEE (SHEET 22)

INDEX TO ADJOINING 7.5 MAPS

NEGAUNEE NW, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 12 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

1	2	3
4		5
6	7	8

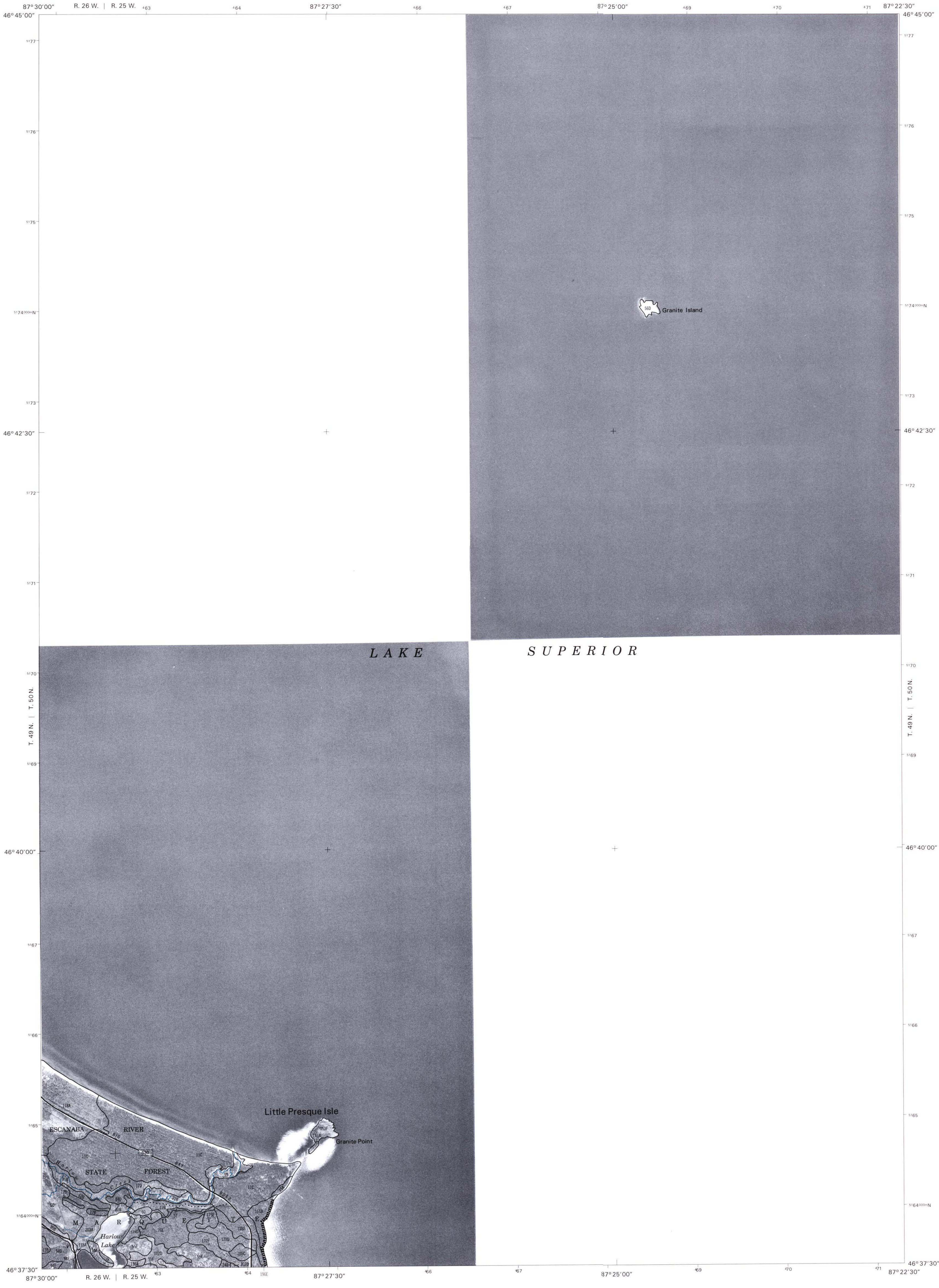
1 BIG BAY (SHEET 7)
2 GRANITE POINT (SHEET 8)
3 (ALL WATER)
4 NEGAUNEE NW (SHEET 12)
5 MARQUETTE NW (SHEET 14)
6 NEGAUNEE SW (SHEET 21)
7 NEGAUNEE (SHEETS 22 AND 23)
8 MARQUETTE (SHEET 24)

INDEX TO ADJOINING 7.5 MAPS

BUCKROE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 13 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MARQUETTE NW QUADRANGLE
SHEET NUMBER 14 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

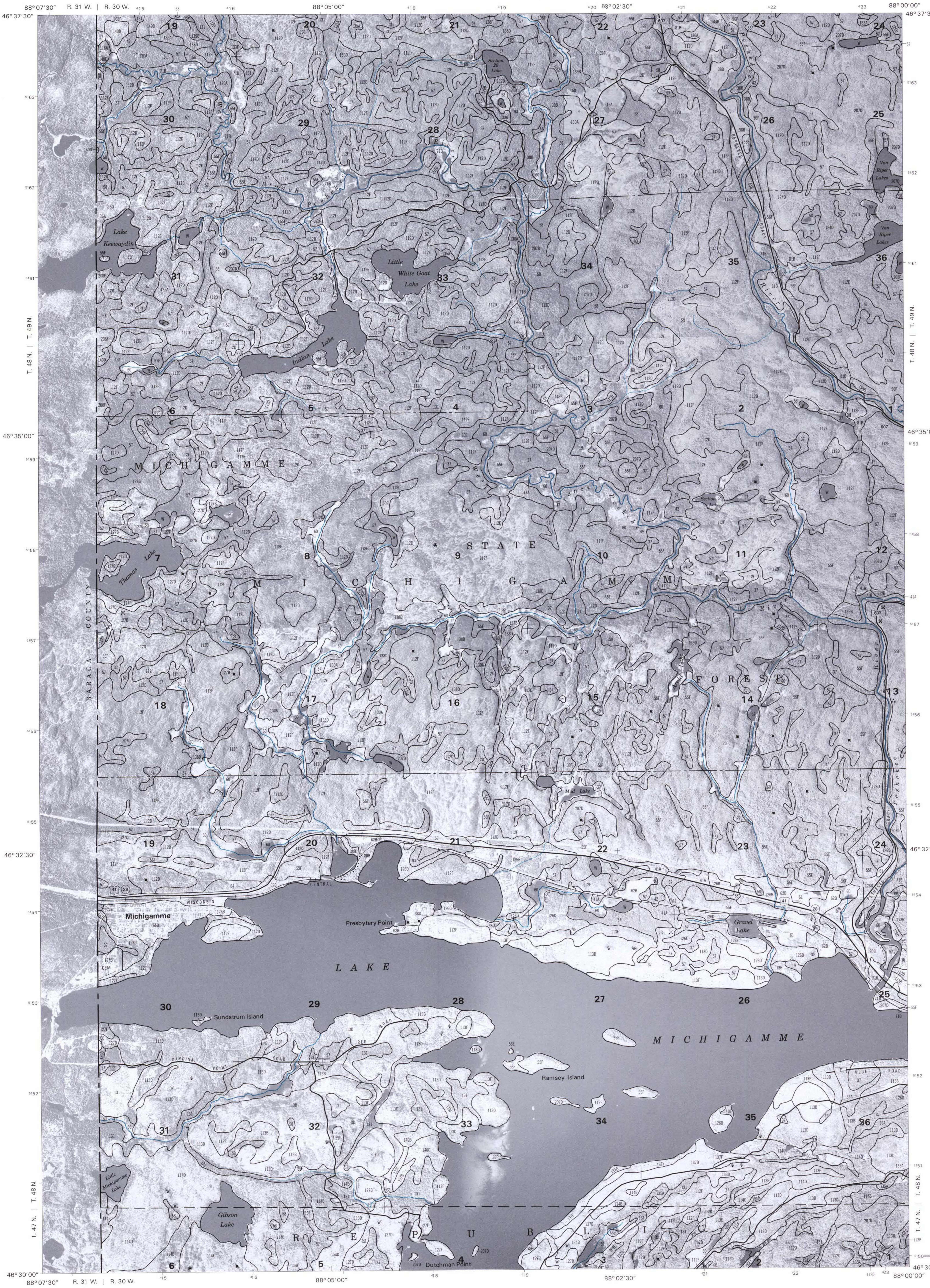
1 GRANITE POINT (SHEET 8)
2 (ALL WATER)
3 (ALL WATER)
4 BUCKROE (SHEET 13)
5 (ALL WATER)
6 NEGAUNEE (SHEET 22 AND 23)
7 MARQUETTE (SHEET 24 AND 25)
8 MARQUETTE OE E (SHEET 26)

INDEX TO ADJOINING 7.5 MAPS

MARQUETTE NW, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 14 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MICHIGAMME QUADRANGLE
SHEET NUMBER 15 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

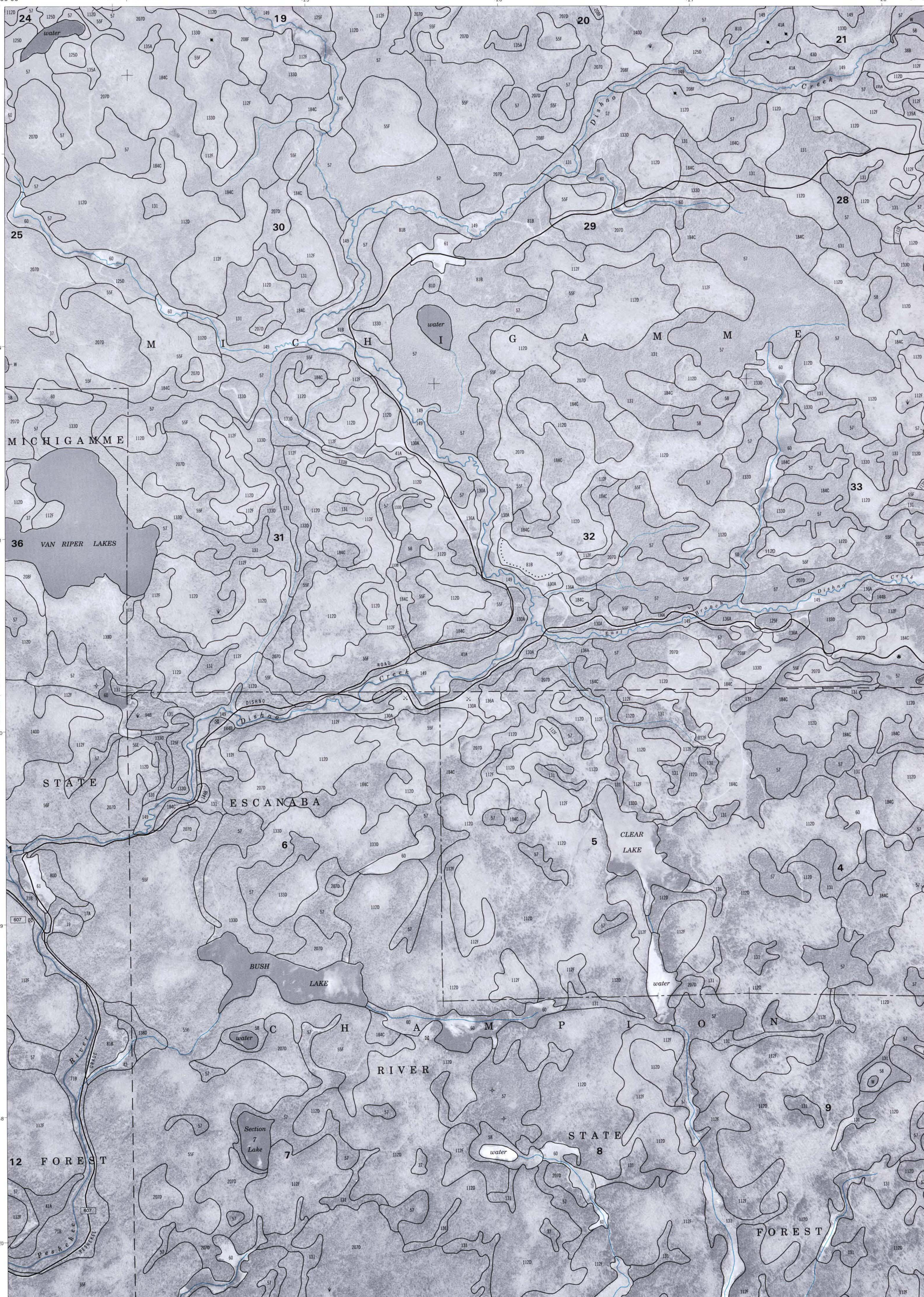
KILOMETERS

1 MOUNT CURWOOD (BARAGA COUNTY)
2 SUMMIT LAKE (SHEET 9)
3 BULLDOG LAKE (SHEET 10)
4 THREE LAKES (BARAGA COUNTY)
5 CHAMPION (SHEETS 16 AND 27)
6 NELSON LAKE (BARAGA COUNTY)
7 WITCH LAKE NE (SHEET 39)
8 REPUBLIC (SHEETS 40 AND 55)

INDEX TO ADJOINING 7.5 MAPS

MICHIGAMME, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 15 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 SUMMIT LAKE (SHEET 9)
2 BULLDOG LAKE (SHEET 10)
3 BULLDOG LAKE (SHEET 10)
4 MICHIGAMME NE (SHEET 15)
5 CHAMPION NE (SHEET 17)
6 MICHIGAMME SE (SHEET 15)
7 CHAMPION SW (SHEET 27)
8 CHAMPION SE (SHEET 28)

INDEX TO ADJOINING 3.75 MAPS

CHAMPION NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 16 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

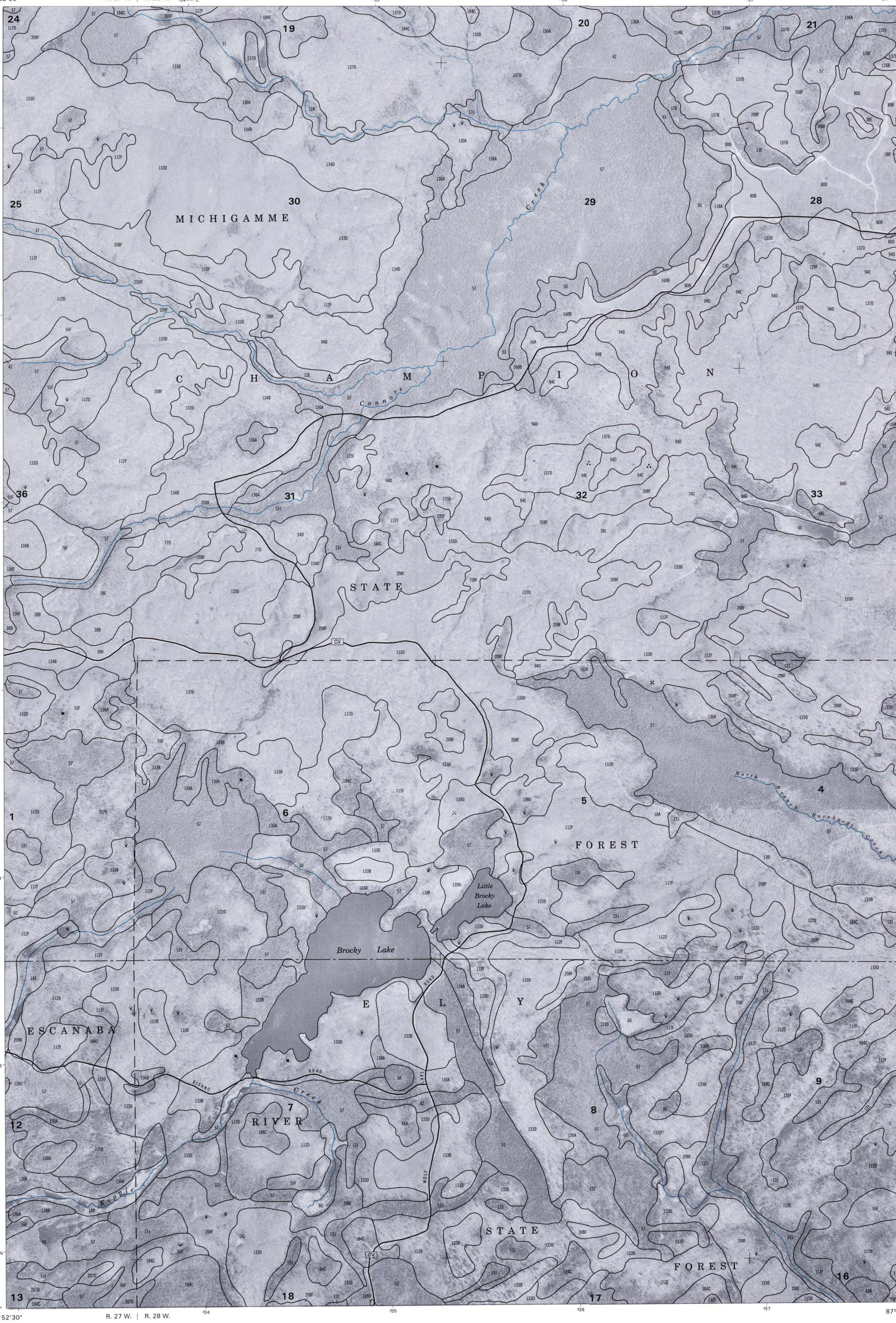
1 BULLDOG LAKE (SHEET 10)
2 BULLDOG LAKE (SHEET 10)
3 SILVER LAKE BASIN (SHEET 11)
4 CHAMPION NW (SHEET 16)
5 DIORITE NW (SHEET 18)
6 CHAMPION SW (SHEET 27)
7 CHAMPION SE (SHEET 28)
8 DIORITE SW (SHEET 29)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
DIORITE NW QUADRANGLE
SHEET NUMBER 18 OF 95

87° 52′30″ R. 27 W. | R. 28 W. 87° 48′45″
46° 37′30″ 46° 37′30″



46° 33′45″ 46° 33′45″
87° 52′30″ R. 27 W. | R. 28 W. 87° 48′45″

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5
FEET 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS 0.5 0 0.5

1 BULLDOG LAKE (SHEET 10)
2 SILVER LAKE BASIN (SHEET 11)
3 SILVER LAKE BASIN (SHEET 11)
4 CHAMPION NE (SHEET 17)
5 DIORITE NE (SHEET 19)
6 CHAMPION SE (SHEET 28)
7 DIORITE SW (SHEET 29)
8 DIORITE SE (SHEET 30)

INDEX TO ADJOINING 3.75 MAPS

DIORITE NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 18 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 — 0 — 0.5 MILES

500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500 FEET

0.5 — 0 — 0.5 KILOMETERS

1	2	3
4		5
6	7	8

1 SILVER LAKE BASIN (SHEET 11)
2 SILVER LAKE BASIN (SHEET 11)
3 NEGAUNEE NW (SHEET 12)
4 DIORITE NW (SHEET 18)
5 NEGAUNEE SW NW (SHEET 20)
6 DIORITE SW (SHEET 29)
7 DIORITE SE (SHEET 30)
8 NEGAUNEE SW SW (SHEET 31)

INDEX TO ADJOINING 3.75 MAPS

87° 45′00″ R. 28 W. | R. 27 W. 87° 41′15″
46° 37′30″ 46° 37′30″

46° 33′45″ 46° 33′45″
87° 45′00″ R. 28 W. | R. 27 W. 87° 41′15″

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

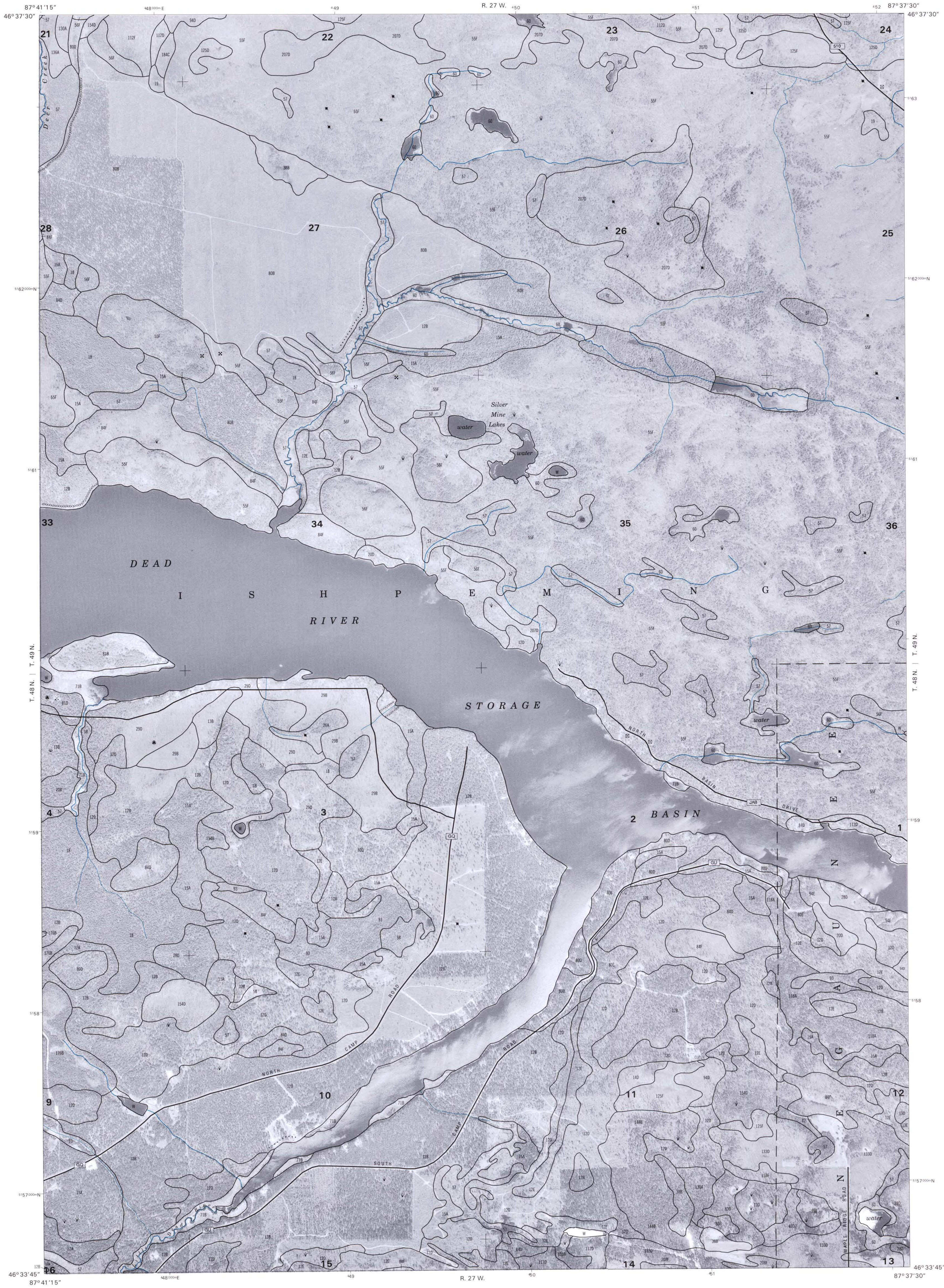
MILES 0.5 0 0.5
FEET 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 SILVER LAKE BASIN (SHEET 11)
2 NEGAUNEE NW (SHEET 12)
3 NEGAUNEE NW (SHEET 12)
4 DIORITE NE (SHEET 19)
5 NEGAUNEE SW NE (SHEET 21)
6 DIORITE SE (SHEET 30)
7 NEGAUNEE SW SW (SHEET 31)
8 NEGAUNEE SW SE (SHEET 32)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

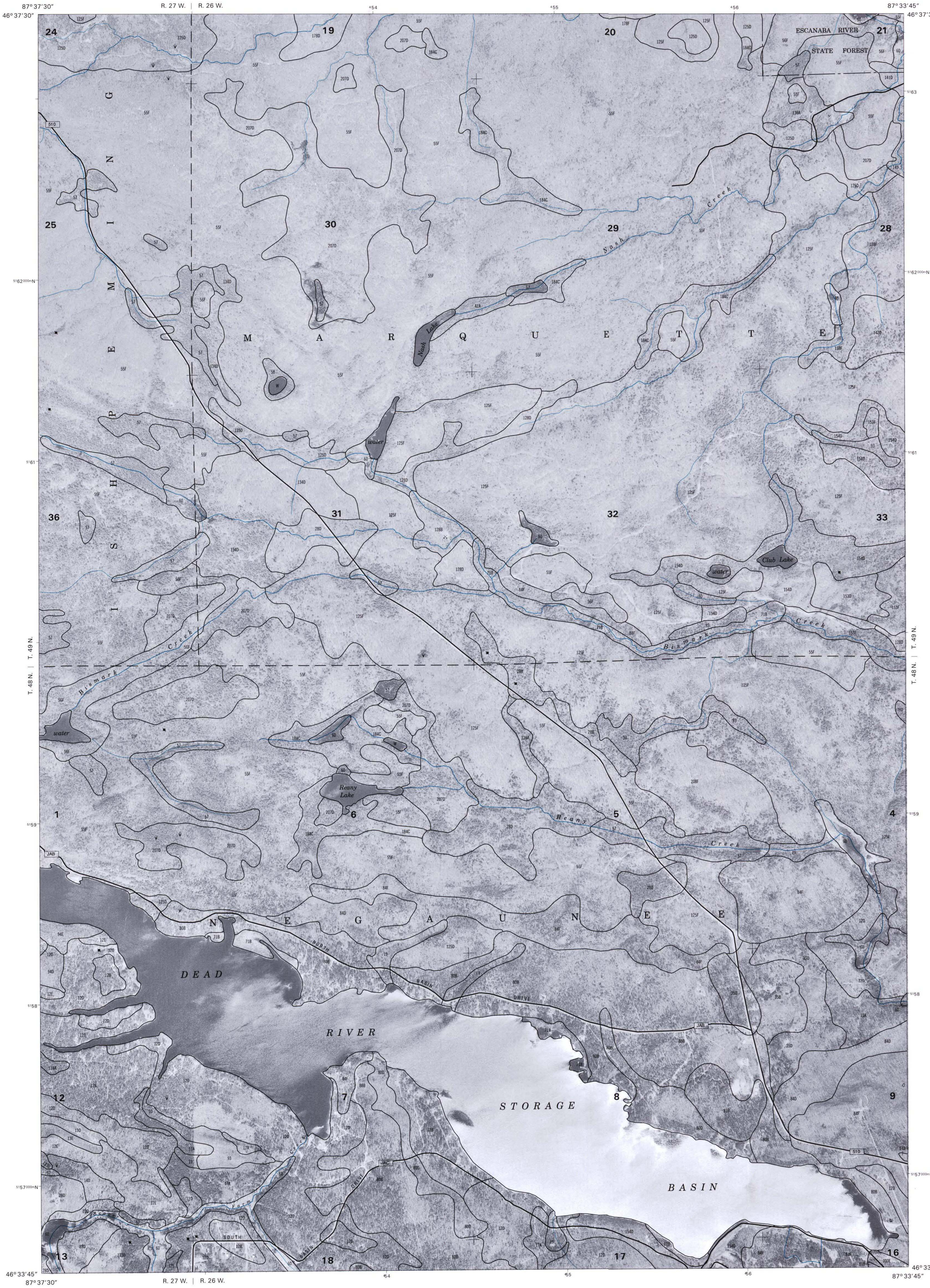
0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1 NEGAUNEE NW (SHEET 12)
2 NEGAUNEE NW (SHEET 12)
3 BUCKROE (SHEET 13)
4 NEGAUNEE SW NW (SHEET 20)
5 NEGAUNEE NW (SHEET 22)
6 NEGAUNEE SW SW (SHEET 31)
7 NEGAUNEE SW SE (SHEET 32)
8 NEGAUNEE SW (SHEET 33)

INDEX TO ADJOINING 3.75 MAPS



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

1	2	3
4		5
6	7	8

1 NEGAUNEE NW (SHEET 12)
2 BUCKROE (SHEET 13)
3 BUCKROE (SHEET 13)
4 NEGAUNEE SW NE (SHEET 21)
5 NEGAUNEE NE (SHEET 23)
6 NEGAUNEE SW SE (SHEET 32)
7 NEGAUNEE SW (SHEET 33)
8 NEGAUNEE SE (SHEET 34)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NEGAUNEE NE QUADRANGLE
SHEET NUMBER 23 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 BUCKROE (SHEET 13)
2 BUCKROE (SHEET 13)
3 MARQUETTE NW (SHEET 14)
4 NEGAUNEE NW (SHEET 22)
5 MARQUETTE NW (SHEET 24)
6 NEGAUNEE SW (SHEET 33)
7 NEGAUNEE SE (SHEET 34)
8 MARQUETTE SW (SHEET 35)

INDEX TO ADJOINING 3.75 MAPS

NEGAUNEE NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 23 OF 95

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Land division data are approximately positioned.

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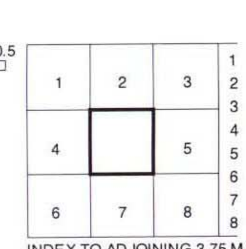
Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5
FEET 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS 0.5 0 0.5



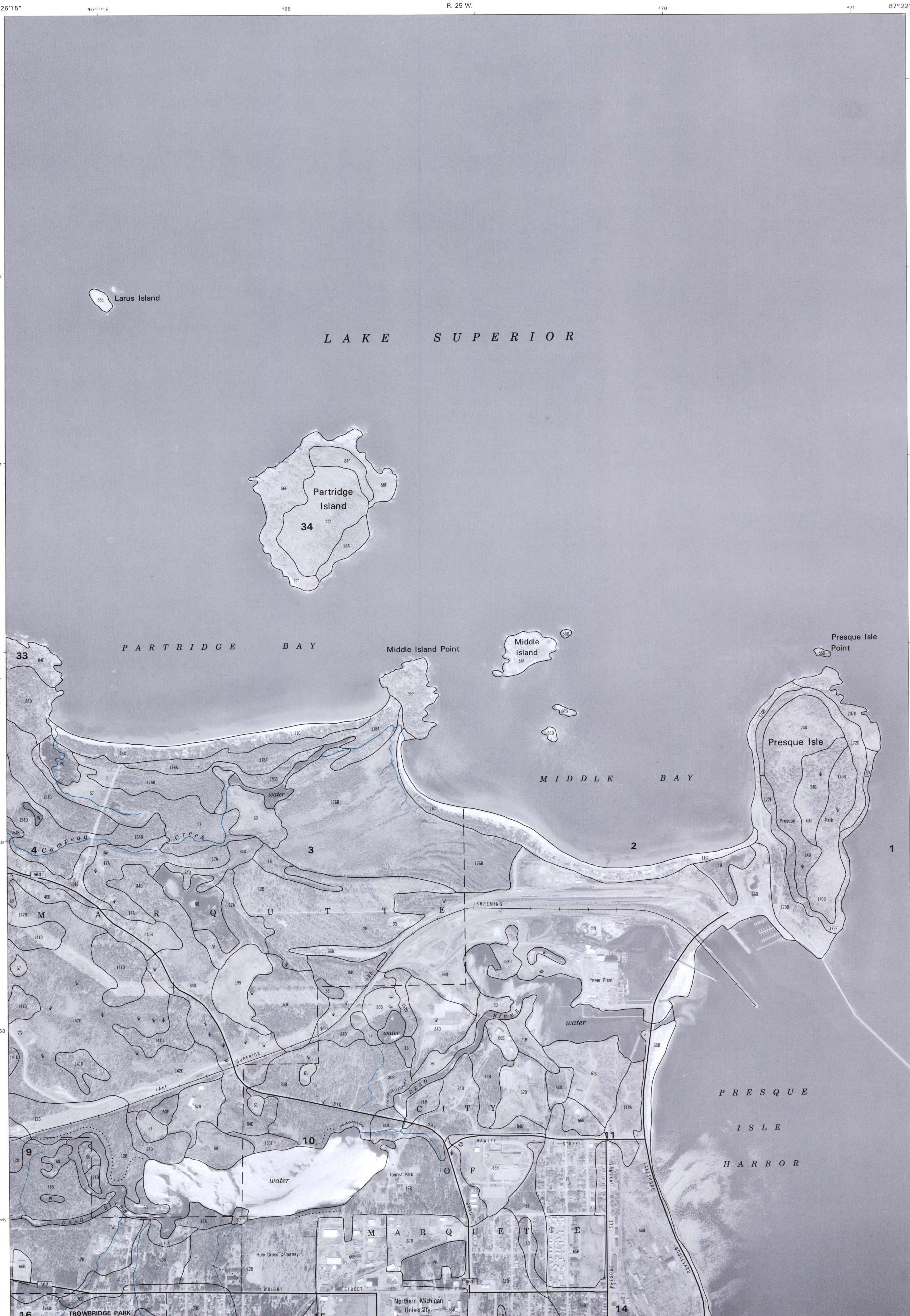
1 BUCKROE SE (SHEET 13)
2 MARQUETTE NW (SHEET 14)
3 MARQUETTE NW (SHEET 14)
4 NEGAUNEE NE (SHEET 23)
5 MARQUETTE NE (SHEET 25)
6 NEGAUNEE SE (SHEET 34)
7 MARQUETTE SW (SHEET 35)
8 MARQUETTE SE (SHEET 36)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 24 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MARQUETTE NE QUADRANGLE
SHEET NUMBER 25 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

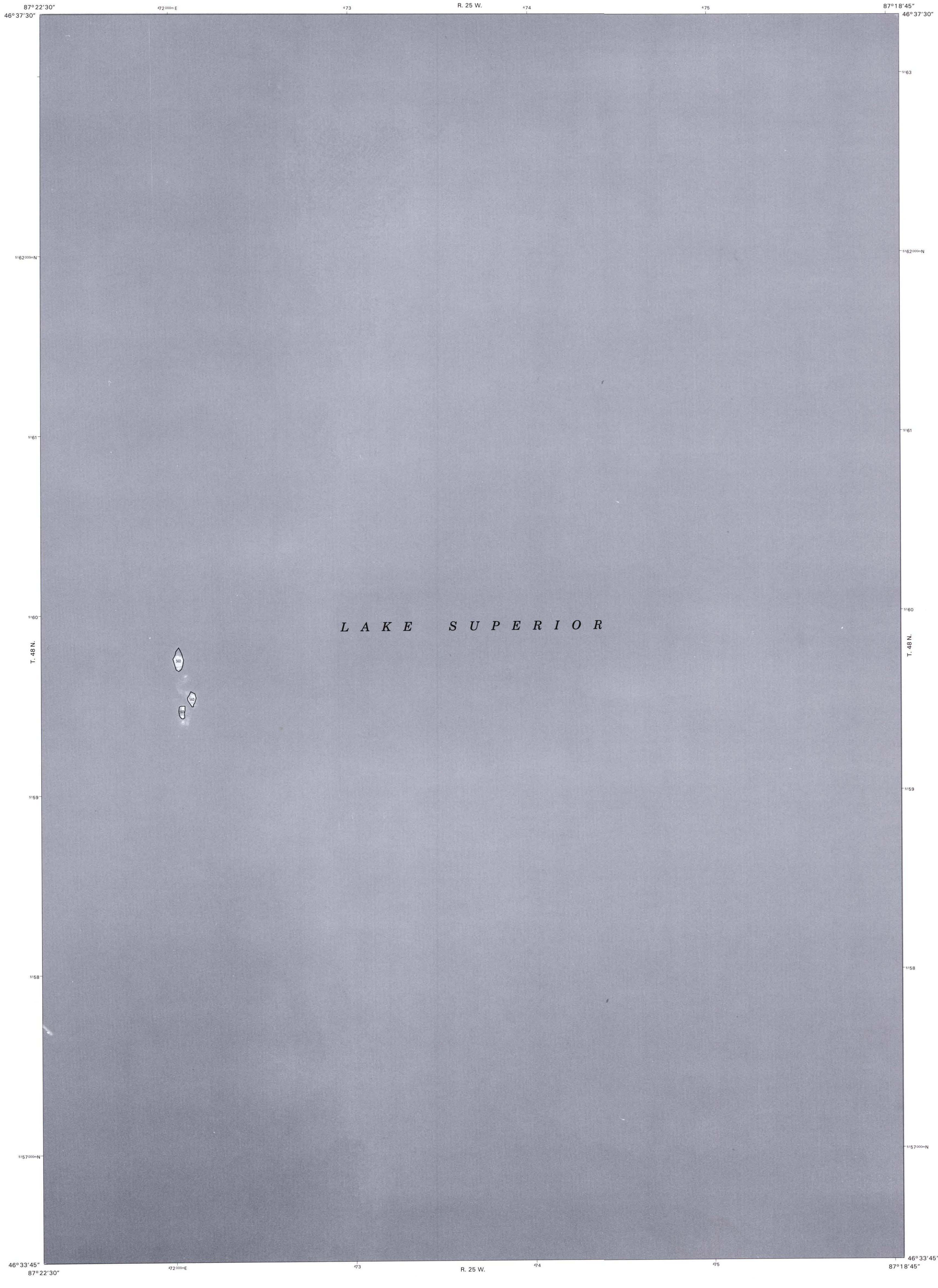
FEET

KILOMETERS

1 MARQUETTE NW (SHEET 14)
2 MARQUETTE NW (SHEET 14)
3 (ALL WATER)
4 MARQUETTE NW (SHEET 24)
5 (ALL WATER)
6 MARQUETTE SW (SHEET 35)
7 MARQUETTE SE (SHEET 36)
8 (ALL WATER)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 25 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 MARQUETTE NW (SHEET 14)
2 (ALL WATER)
3 (ALL WATER)
4 MARQUETTE NE (SHEET 25)
5 (ALL WATER)
6 MARQUETTE SE (SHEET 36)
7 MARQUETTE OE E SW (SHEET 37)
8 (ALL WATER)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE OE E NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 26 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 MICHIGAMME (SHEET 15)
2 CHAMPION NW (SHEET 16)
3 CHAMPION NE (SHEET 17)
4 MICHIGAMME (SHEET 15)
5 CHAMPION SE (SHEET 28)
6 WITCH LAKE NE NE (SHEET 39)
7 REPUBLIC NW (SHEET 40)
8 REPUBLIC NE (SHEET 41)

INDEX TO ADJOINING 3.75 MAPS

CHAMPION SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 27 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
CHAMPION SE QUADRANGLE
SHEET NUMBER 28 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 CHAMPION NW (SHEET 17)
2 CHAMPION NE (SHEET 18)
3 DIORITE NW (SHEET 19)
4 CHAMPION SW (SHEET 27)
5 DIORITE SW (SHEET 29)
6 REPUBLIC NW (SHEET 40)
7 REPUBLIC NE (SHEET 41)
8 GREENWOOD NW (SHEET 42)

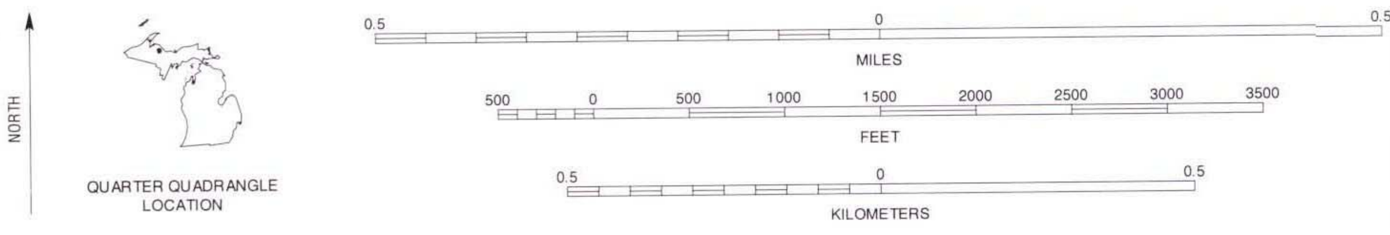
INDEX TO ADJOINING 3.75 MAPS

CHAMPION SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 28 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.



INDEX TO ADJOINING 3.75 MAPS

1 CHAMPION NE (SHEET 17)
2 DIORITE NW (SHEET 18)
3 DIORITE NE (SHEET 19)
4 CHAMPION SE (SHEET 28)
5 DIORITE SE (SHEET 30)
6 REPUBLIC NE (SHEET 41)
7 GREENWOOD NW (SHEET 42)
8 GREENWOOD NE (SHEET 43)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

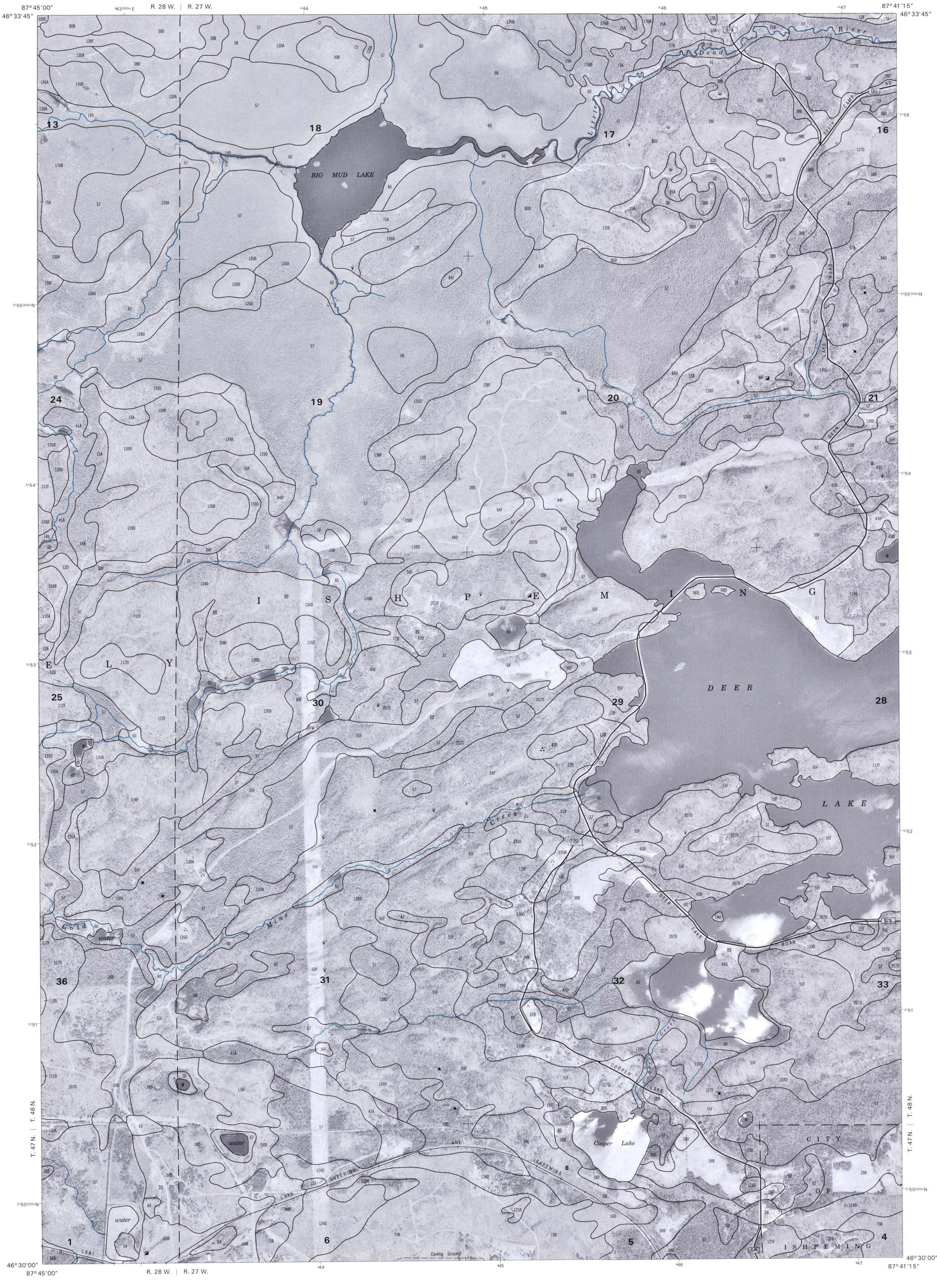
1	2	3
4		5
6	7	8

1 DIORITE NW (SHEET 18)
2 DIORITE NE (SHEET 19)
3 NEGAUNEE SW NW (SHEET 20)
4 DIORITE SW (SHEET 29)
5 NEGAUNEE SW SW (SHEET 31)
6 GREENWOOD NW (SHEET 42)
7 GREENWOOD NE (SHEET 43)
8 ISHPEMING NW (SHEET 44)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NEGAUNEE SW SW QUADRANGLE
SHEET NUMBER 31 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES: 0.5 0 0.5
FEET: 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS: 0.5 0 0.5

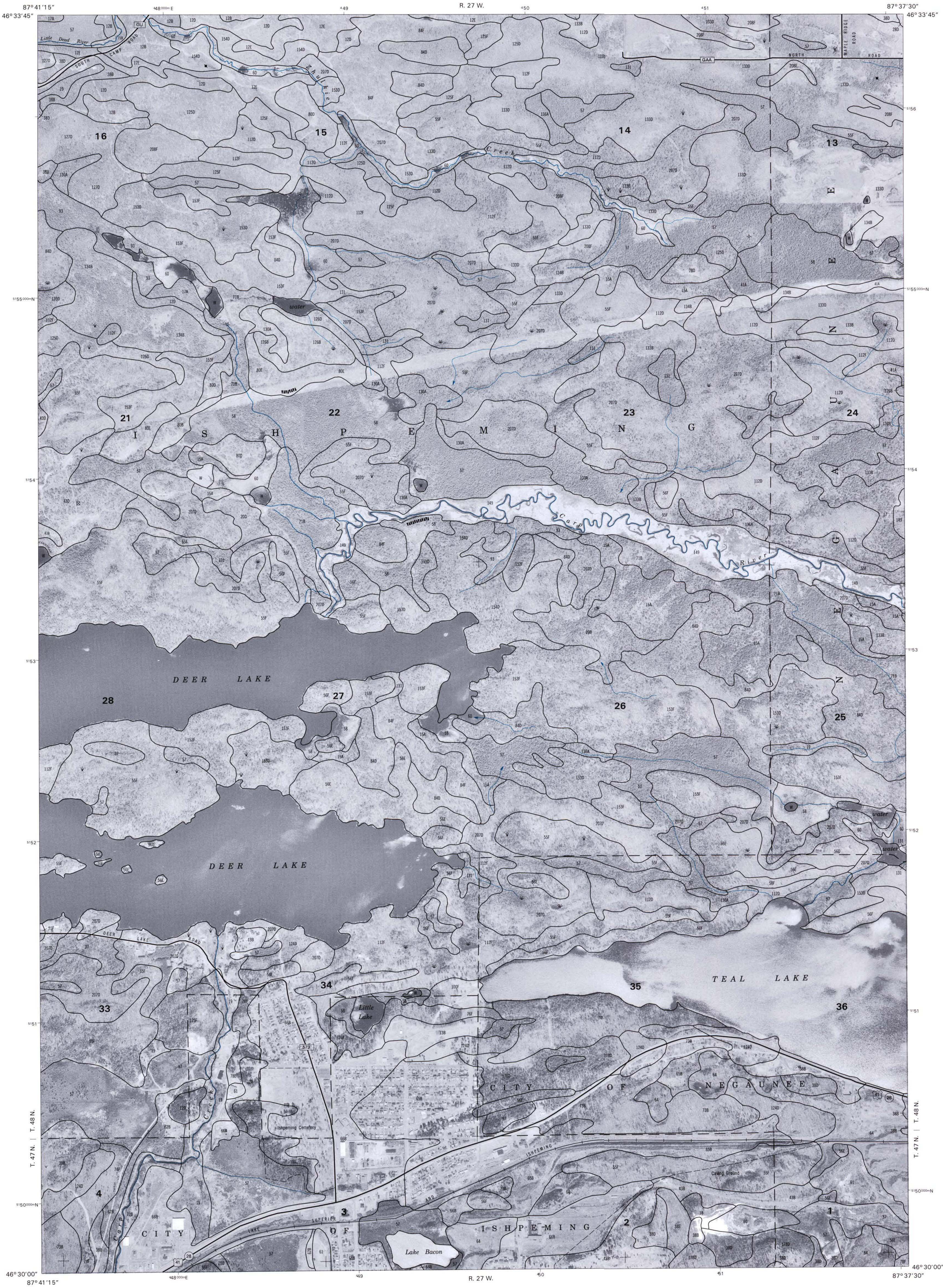
1 DIORITE NE (SHEET 19)
2 NEGAUNEE SW NW (SHEET 20)
3 NEGAUNEE SW NE (SHEET 21)
4 DIORITE SE (SHEET 30)
5 NEGAUNEE SW SE (SHEET 32)
6 GREENWOOD NE (SHEET 43)
7 ISHPEMING NW (SHEET 44)
8 ISHPEMING NE (SHEET 45)

INDEX TO ADJOINING 3.75 MAPS

NEGAUNEE SW SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 31 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NEGAUNEE SW SE QUADRANGLE
SHEET NUMBER 32 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

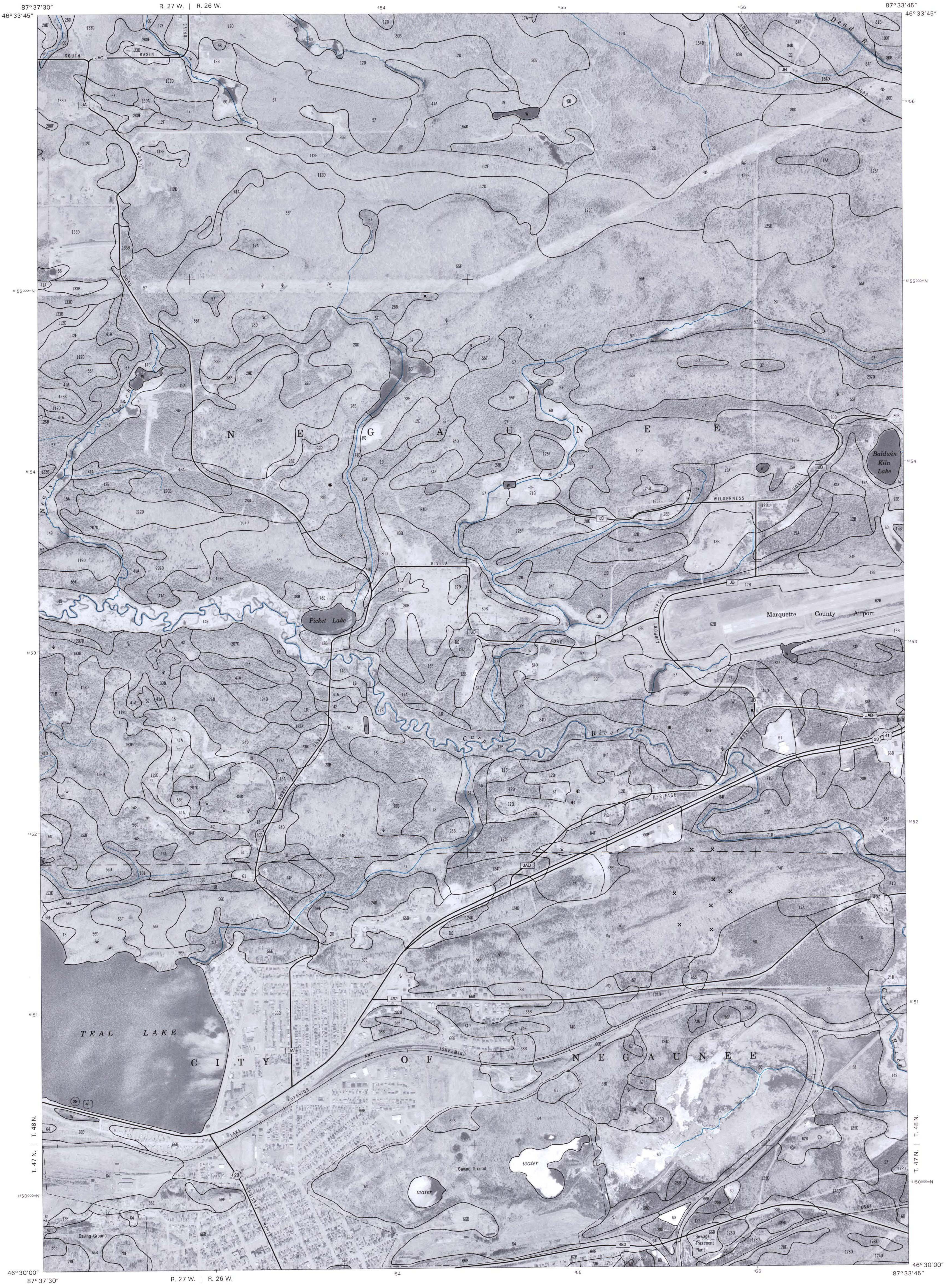
MILES 0.5 0 0.5
FEET 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 NEGAUNEE SW NW (SHEET 20)
2 NEGAUNEE SW NE (SHEET 21)
3 NEGAUNEE NW (SHEET 22)
4 NEGAUNEE SW SW (SHEET 31)
5 NEGAUNEE SW (SHEET 33)
6 ISHPEMING NW (SHEET 44)
7 ISHPEMING NE (SHEET 45)
8 PALMER NW (SHEET 46)

INDEX TO ADJOINING 3.75 MAPS

NEGAUNEE SW SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 32 OF 95



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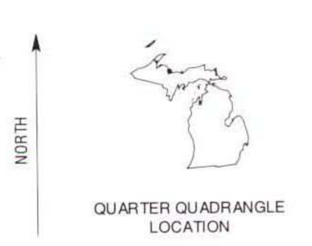
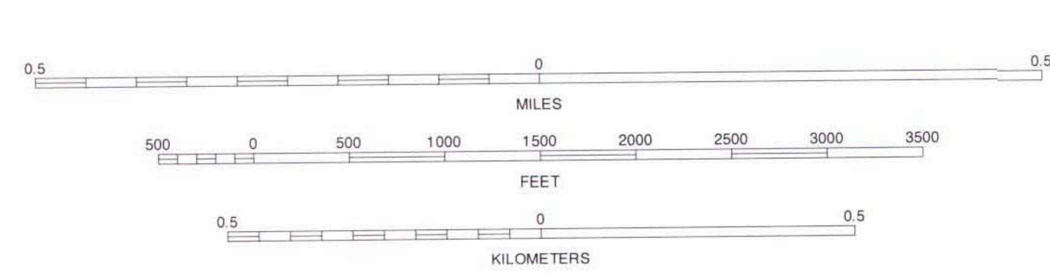
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.





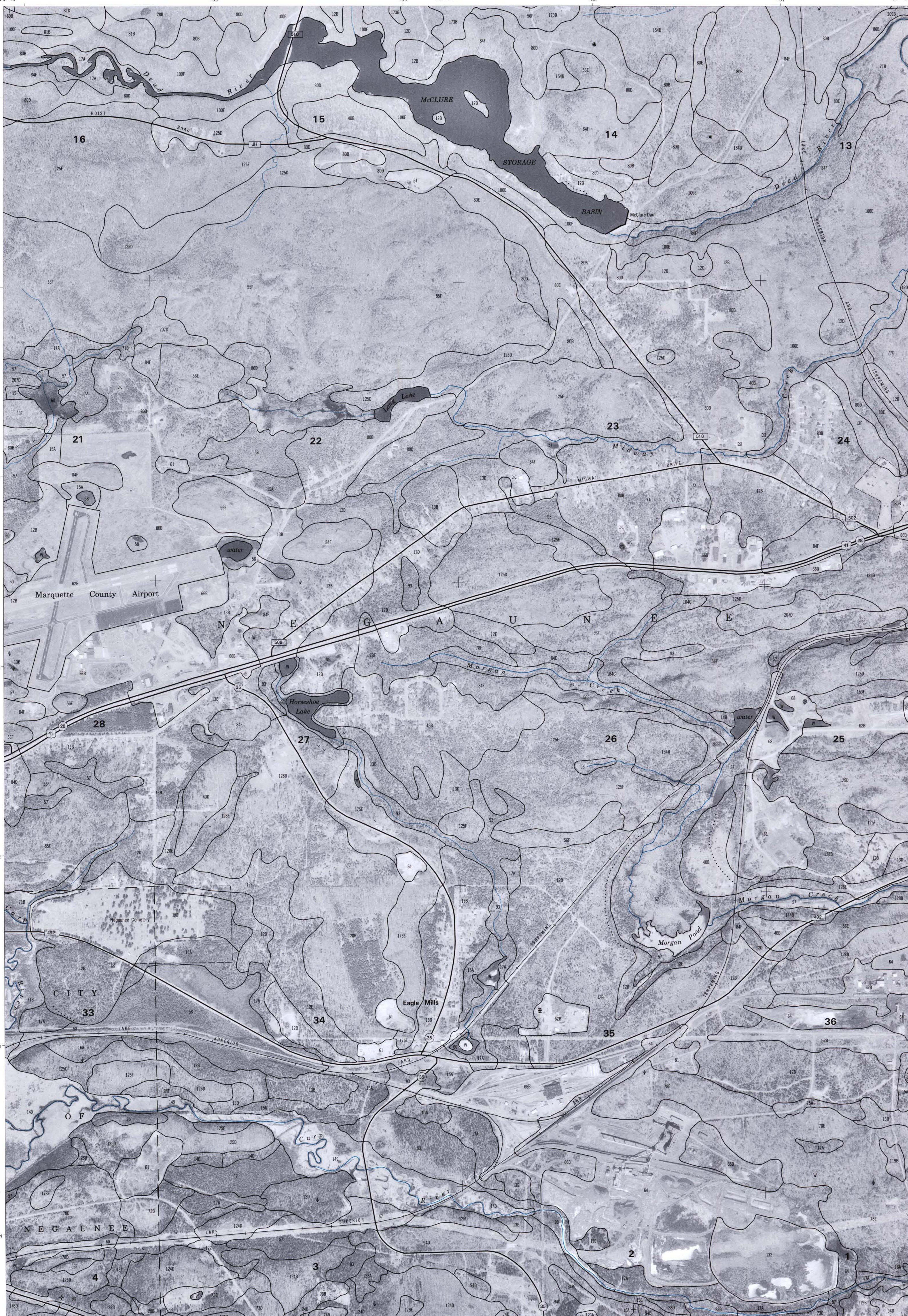
1	2	3
4		5
6	7	8

1 NEGAUNEE SW NE (SHEET 21)
2 NEGAUNEE NW (SHEET 22)
3 NEGAUNEE NE (SHEET 23)
4 NEGAUNEE SW SE (SHEET 32)
5 NEGAUNEE SE (SHEET 34)
6 ISHPEMING NE (SHEET 45)
7 PALMER NW (SHEET 46)
8 PALMER NE (SHEET 47)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NEGAUNEE SE QUADRANGLE
SHEET NUMBER 34 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

1	2	3
4		5
6	7	8

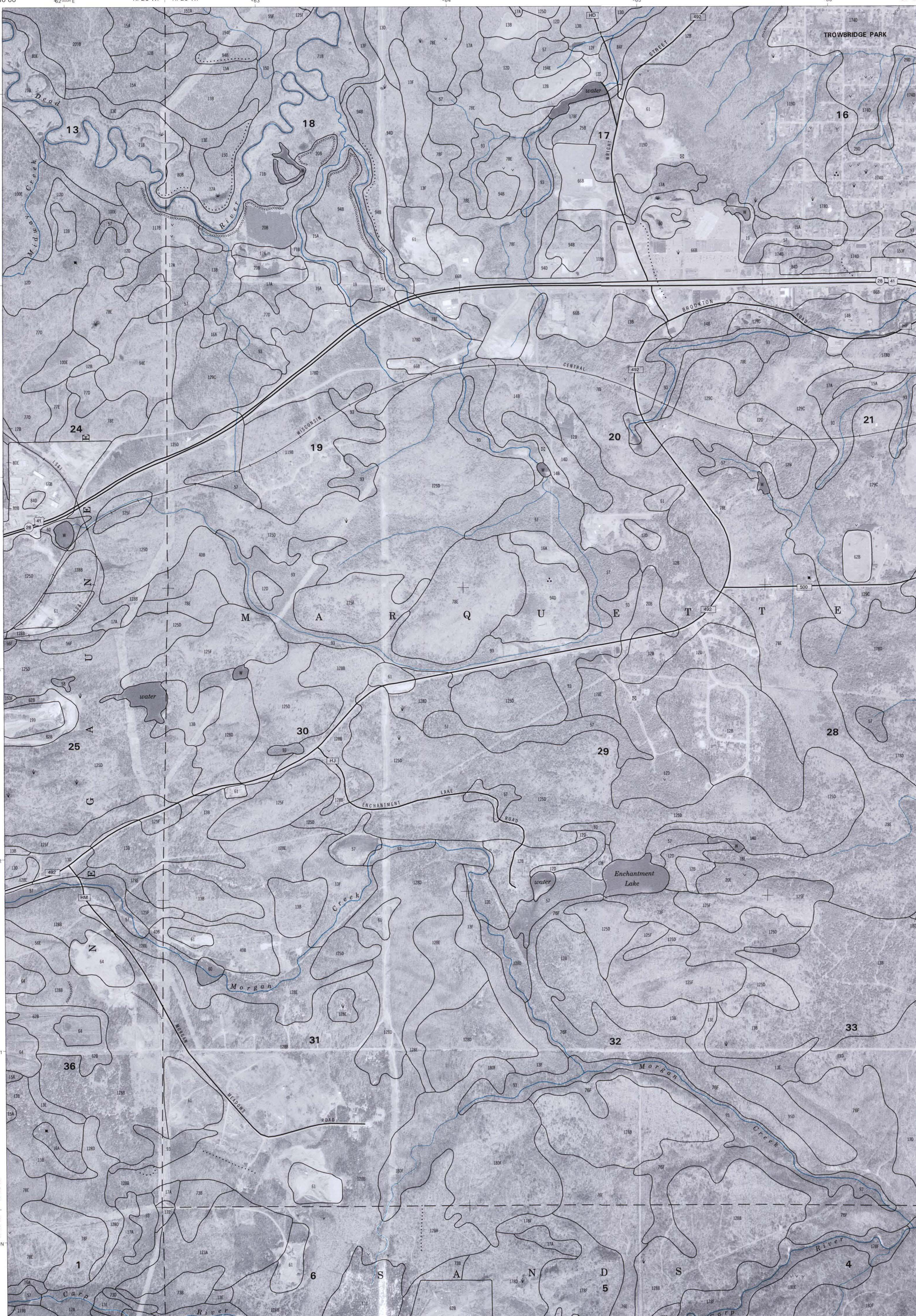
1 NEGAUNEE NW (SHEET 22)
2 NEGAUNEE NE (SHEET 23)
3 MARQUETTE NW (SHEET 24)
4 NEGAUNEE SW (SHEET 33)
5 MARQUETTE SW (SHEET 35)
6 PALMER NW (SHEET 46)
7 PALMER NE (SHEET 47)
8 SANDS NW (SHEET 48)

INDEX TO ADJOINING 3.75 MAPS

NEGAUNEE SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 34 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MARQUETTE SW QUADRANGLE
SHEET NUMBER 35 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

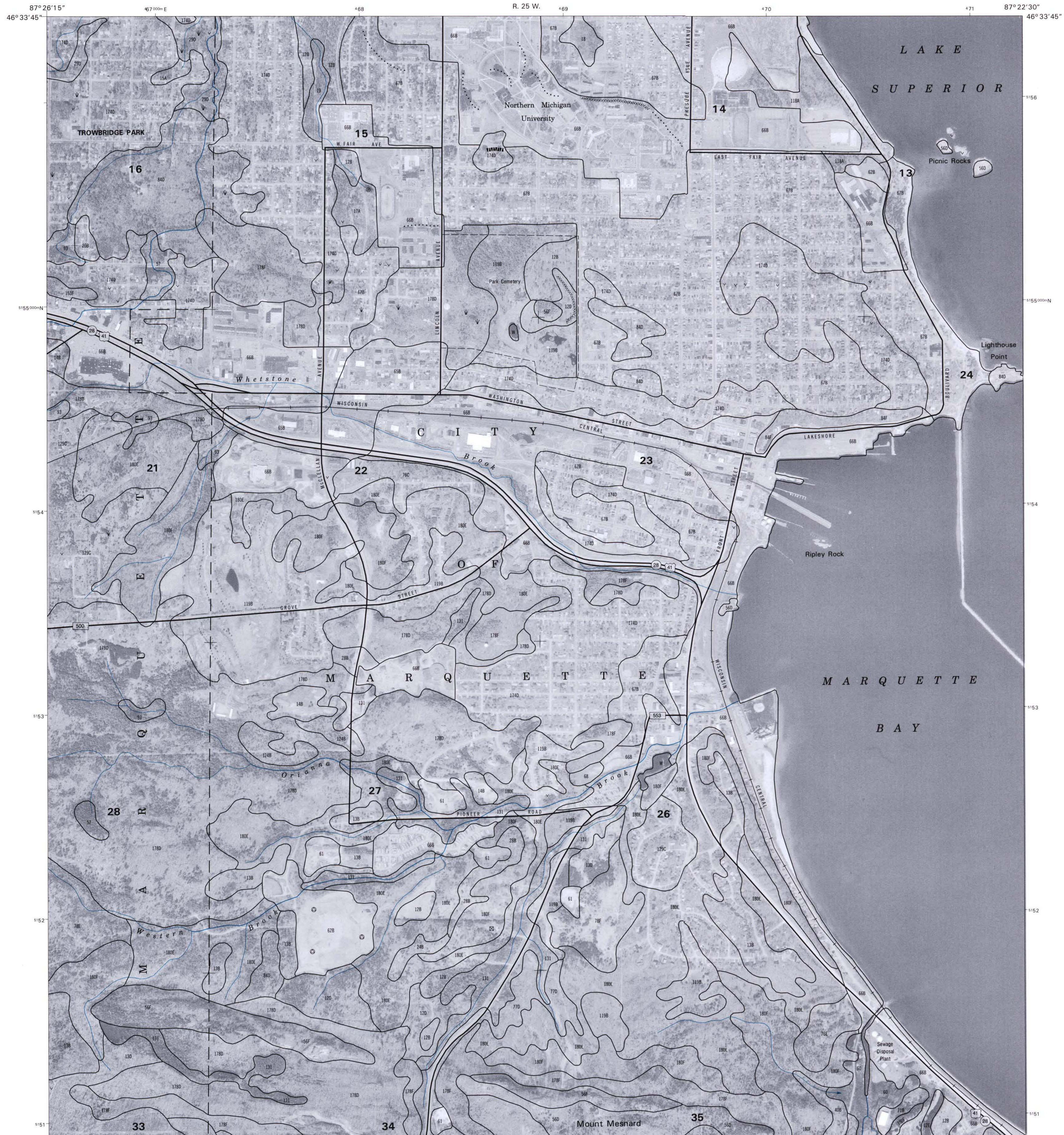
1 NEGAUNEE NE (SHEET 23)
2 MARQUETTE NW (SHEET 24)
3 MARQUETTE NE (SHEET 25)
4 NEGAUNEE SE (SHEET 34)
5 MARQUETTE SE (SHEET 36)
6 PALMER NE (SHEET 47)
7 SANDS NW (SHEET 48)
8 SANDS NE (SHEET 49)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 35 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MARQUETTE SE QUADRANGLE
SHEET NUMBER 36 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

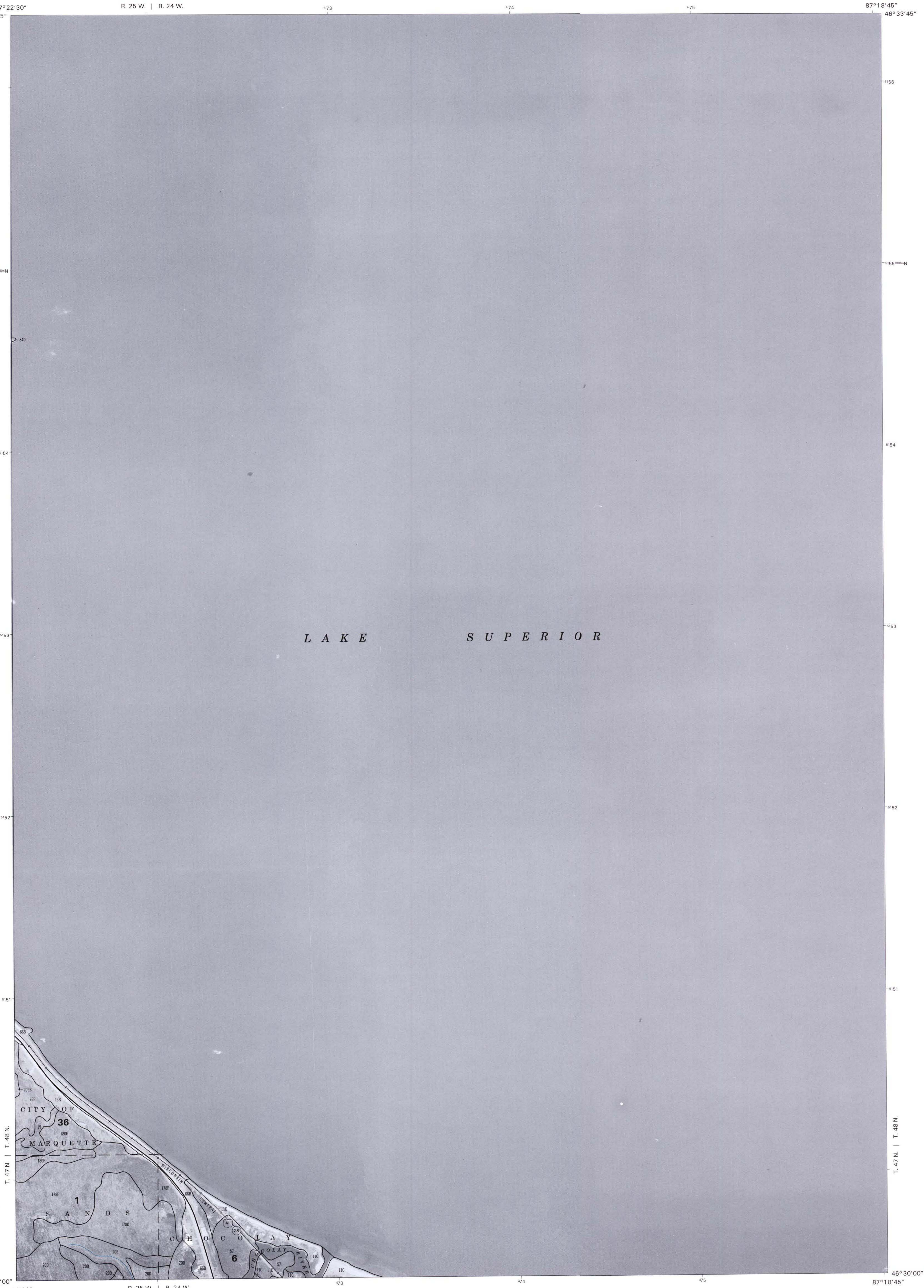
1 MARQUETTE NW (SHEET 24)
2 MARQUETTE NE (SHEET 25)
3 MARQUETTE OE E NW (SHEET 26)
4 MARQUETTE SW (SHEET 35)
5 MARQUETTE OE E SW (SHEET 37)
6 SANDS NW (SHEET 48)
7 SANDS NE (SHEET 49)
8 HARVEY NW (SHEET 50)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 36 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MARQUETTE OE E SW QUADRANGLE
SHEET NUMBER 37 OF 95



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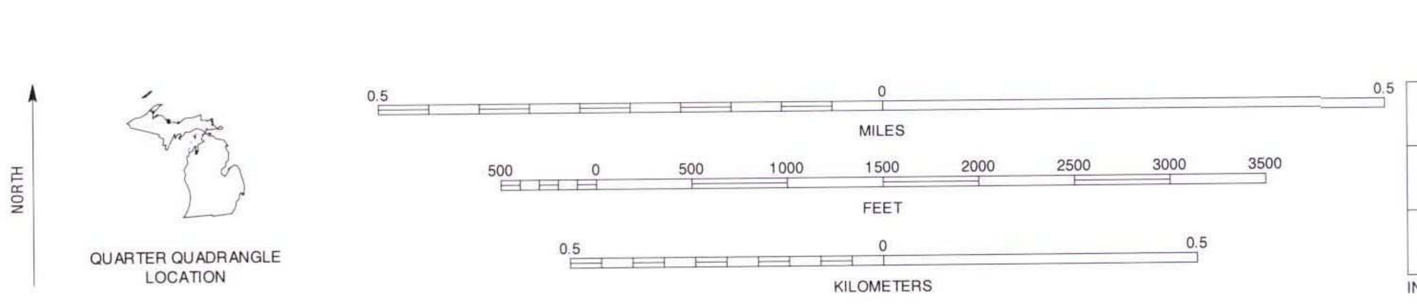
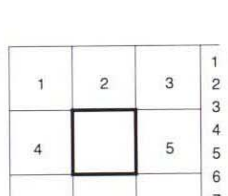
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

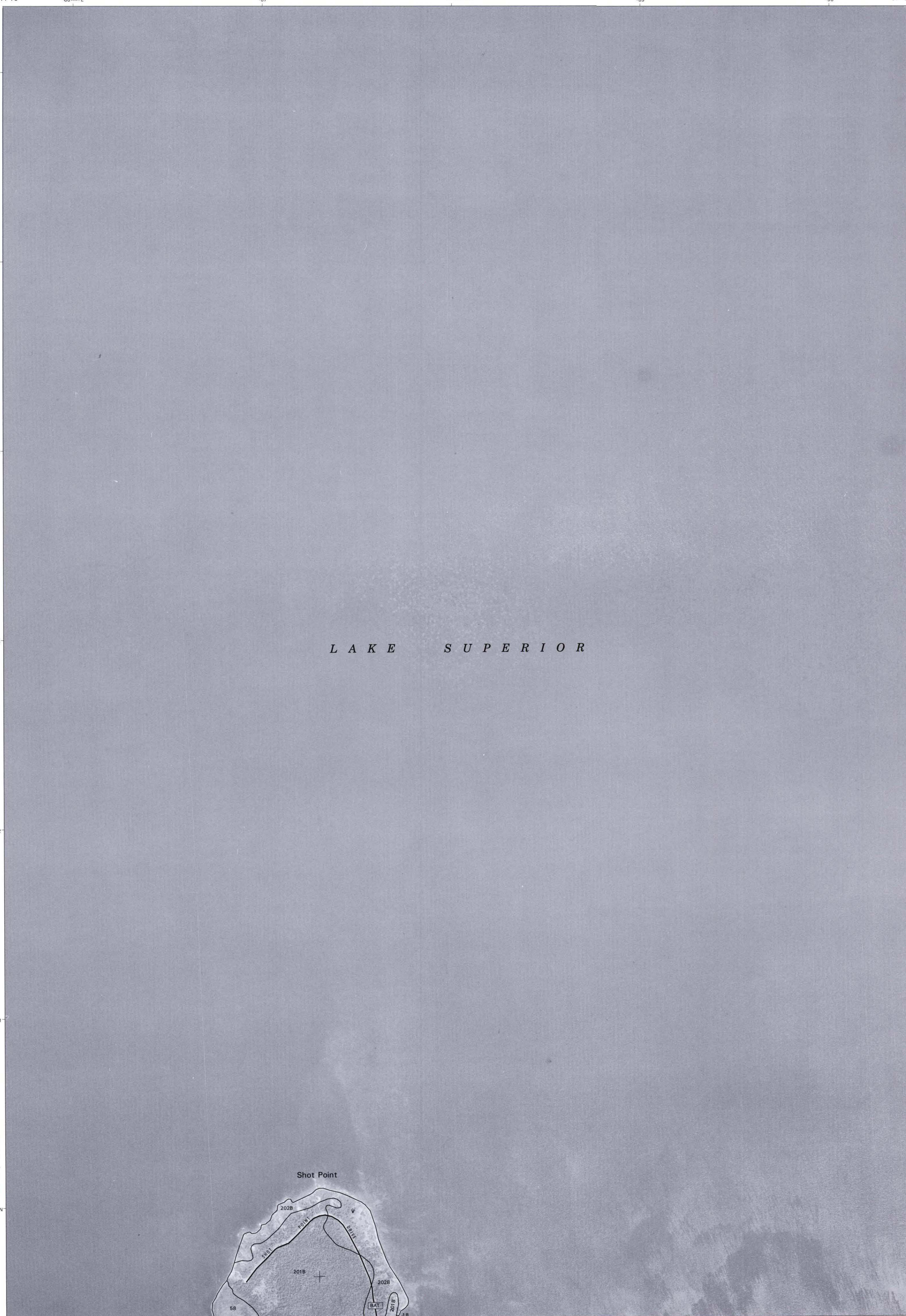




1 (MARQUETTE NE (SHEET 25)
2 (MARQUETTE OE E NW (SHEET 26)
3 (ALL WATER)
4 MARQUETTE SE (SHEET 36)
5 (ALL WATER)
6 SANDS NE (SHEET 49)
7 HARVEY NW (SHEET 50)
8 HARVEY NE (SHEET 51)

INDEX TO ADJOINING 3.75 MAPS

MARQUETTE OE E SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 37 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 (ALL WATER)
2 (ALL WATER)
3 (ALL WATER)
4 (ALL WATER)
5 (ALL WATER)
6 SKANDIA NW (SHEET 52)
7 SKANDIA NE (SHEET 53)
8 SAND RIVER NW (SHEET 54)

INDEX TO ADJOINING 3.75 MAPS

SHOT POINT (DIGITAL) SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 38 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
WITCH LAKE NE QUADRANGLE
SHEET NUMBER 39 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

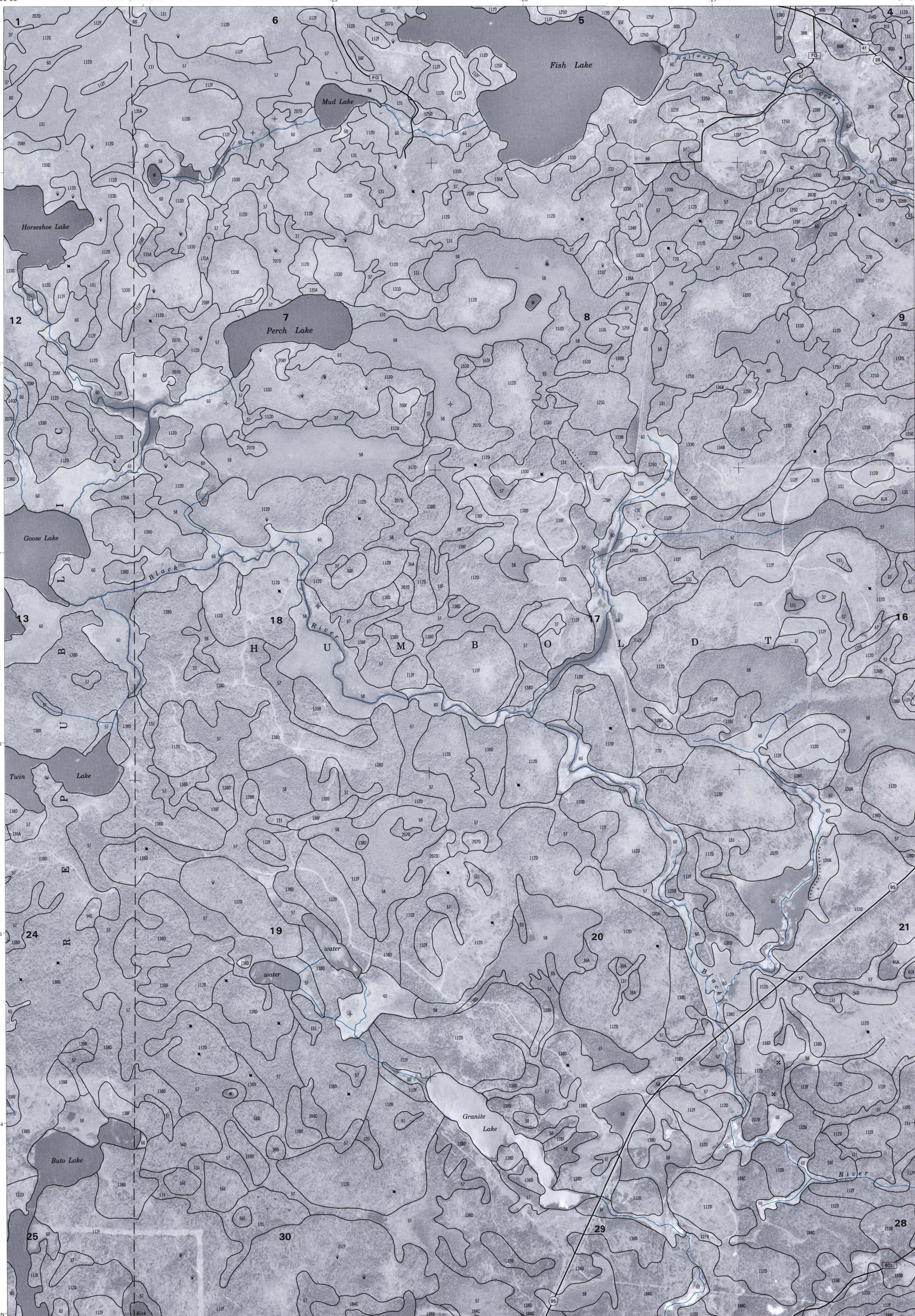
KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 THREE LAKES (BARAGA COUNTY)
2 MICHIGAMME (SHEET 15)
3 CHAMPION (SHEETS 16,17,27,28)
4 NELSON LAKE (BARAGA COUNTY)
5 REPUBLIC (SHEETS 40,41,55,56)
6 HICKMAN LAKE (BARAGA COUNTY)
7 WITCH LAKE (SHEET 70)
8 REPUBLIC SW (SHEET 71)

WITCH LAKE NE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 39 OF 95

88°00'00" R. 30 W. | R. 29 W. 46°30'00" 87°56'15" 46°30'00"



46°26'15" 88°00'00" R. 30 W. | R. 29 W. 87°56'15" 46°26'15"

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES: 0.5 0 0.5

FEET: 500 0 500 1000 1500 2000 2500 3000 3500

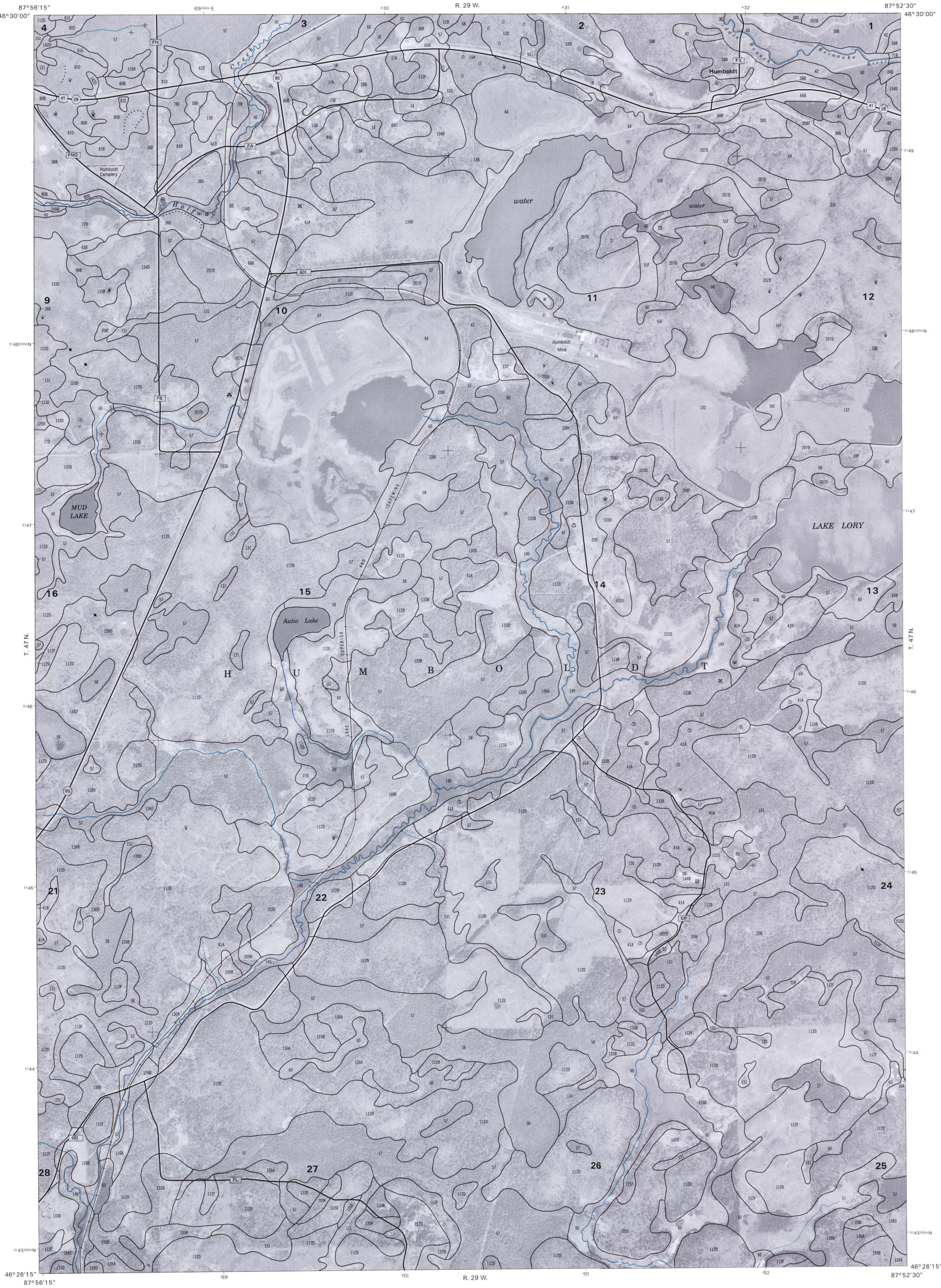
KILOMETERS: 0.5 0 0.5

INDEX TO ADJOINING 3.75 MAPS

1 MICHIGAMME (SHEET 15)
2 CHAMPION SW (SHEET 27)
3 CHAMPION SE (SHEET 28)
4 WITCH LAKE NE (SHEET 39)
5 REPUBLIC NE (SHEET 41)
6 WITCH LAKE NE (SHEET 39)
7 REPUBLIC SW (SHEET 55)
8 REPUBLIC SE (SHEET 56)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
REPUBLIC NE QUADRANGLE
SHEET NUMBER 41 OF 95



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Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 CHAMPION SW (SHEET 27)
2 CHAMPION SE (SHEET 28)
3 DIORITE SW (SHEET 29)
4 REPUBLIC NW (SHEET 40)
5 GREENWOOD NW (SHEET 42)
6 REPUBLIC SW (SHEET 55)
7 REPUBLIC SE (SHEET 56)
8 GREENWOOD SW (SHEET 57)

INDEX TO ADJOINING 3.75 MAPS

REPUBLIC NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 41 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

INDEX TO ADJOINING 3.75 MAPS

1 CHAMPION SE (SHEET 28)
2 DIORITE SW (SHEET 29)
3 DIORITE SE (SHEET 30)
4 REPUBLIC NE (SHEET 41)
5 GREENWOOD NE (SHEET 43)
6 REPUBLIC SE (SHEET 56)
7 GREENWOOD SW (SHEET 57)
8 GREENWOOD SE (SHEET 58)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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Land division data are approximately positioned.

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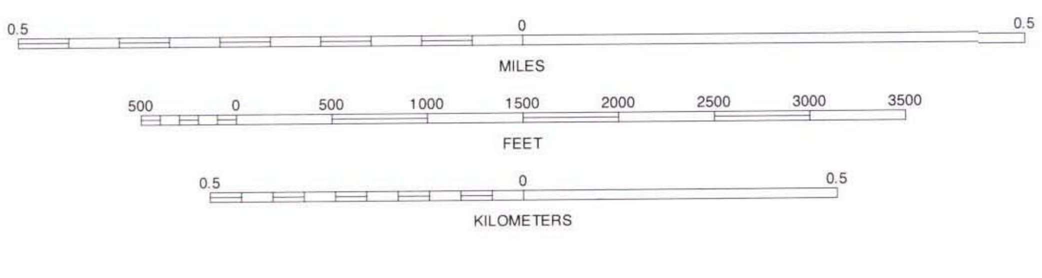
Digital data are available for this quadrangle.



1	2	3
4		5
6	7	8

1 DIORITE SW (SHEET 29)
2 DIORITE SE (SHEET 30)
3 NEGAUNEE SW SW (SHEET 31)
4 GREENWOOD NW (SHEET 42)
5 ISHPEMING NW (SHEET 44)
6 GREENWOOD SW (SHEET 57)
7 GREENWOOD SE (SHEET 58)
8 ISHPEMING SW (SHEET 59)

INDEX TO ADJOINING 3.75 MAPS

GREENWOOD NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 43 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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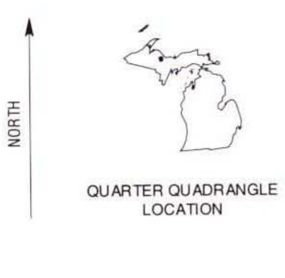
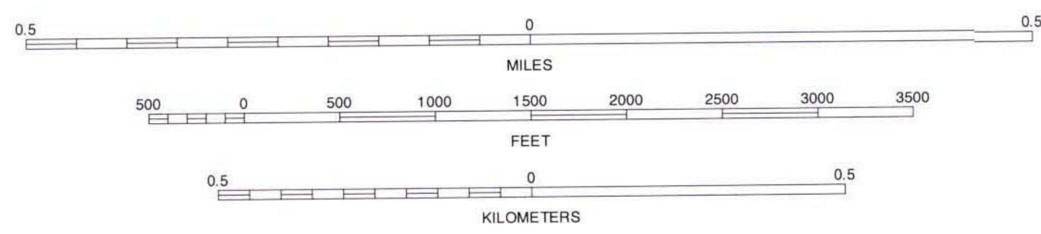
Digital data are available for this quadrangle.





1	2	3
4		5
6	7	8

1 DIORITE SE (SHEET 30)
2 NEGAUNEE SW SW (SHEET 31)
3 NEGAUNEE SW SE (SHEET 32)
4 GREENWOOD NE (SHEET 43)
5 ISHPEMING NE (SHEET 45)
6 GREENWOOD SE (SHEET 58)
7 ISHPEMING SW (SHEET 59)
8 ISHPEMING SE (SHEET 60)
INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
ISHPEMING NE QUADRANGLE
SHEET NUMBER 45 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

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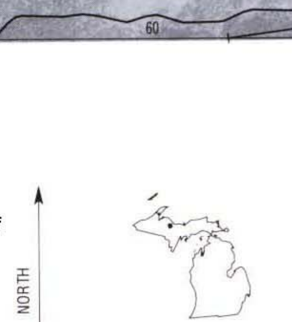
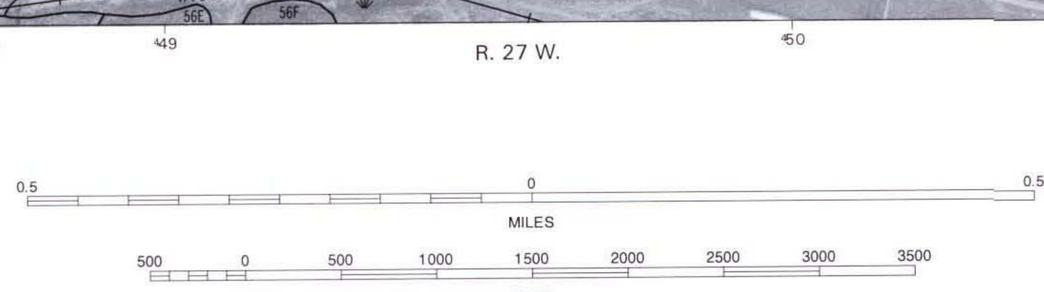
Digital data are available for this quadrangle.





1	2	3
4		5
6	7	8

1 NEGAUNEE SW SW (SHEET 31)
2 NEGAUNEE SW SE (SHEET 32)
3 NEGAUNEE SW (SHEET 33)
4 ISHPEMING NW (SHEET 44)
5 PALMER NW (SHEET 46)
6 ISHPEMING SW (SHEET 59)
7 ISHPEMING SE (SHEET 60)
8 PALMER SW (SHEET 61)

INDEX TO ADJOINING 3.75 MAPS

ISHPEMING NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 45 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

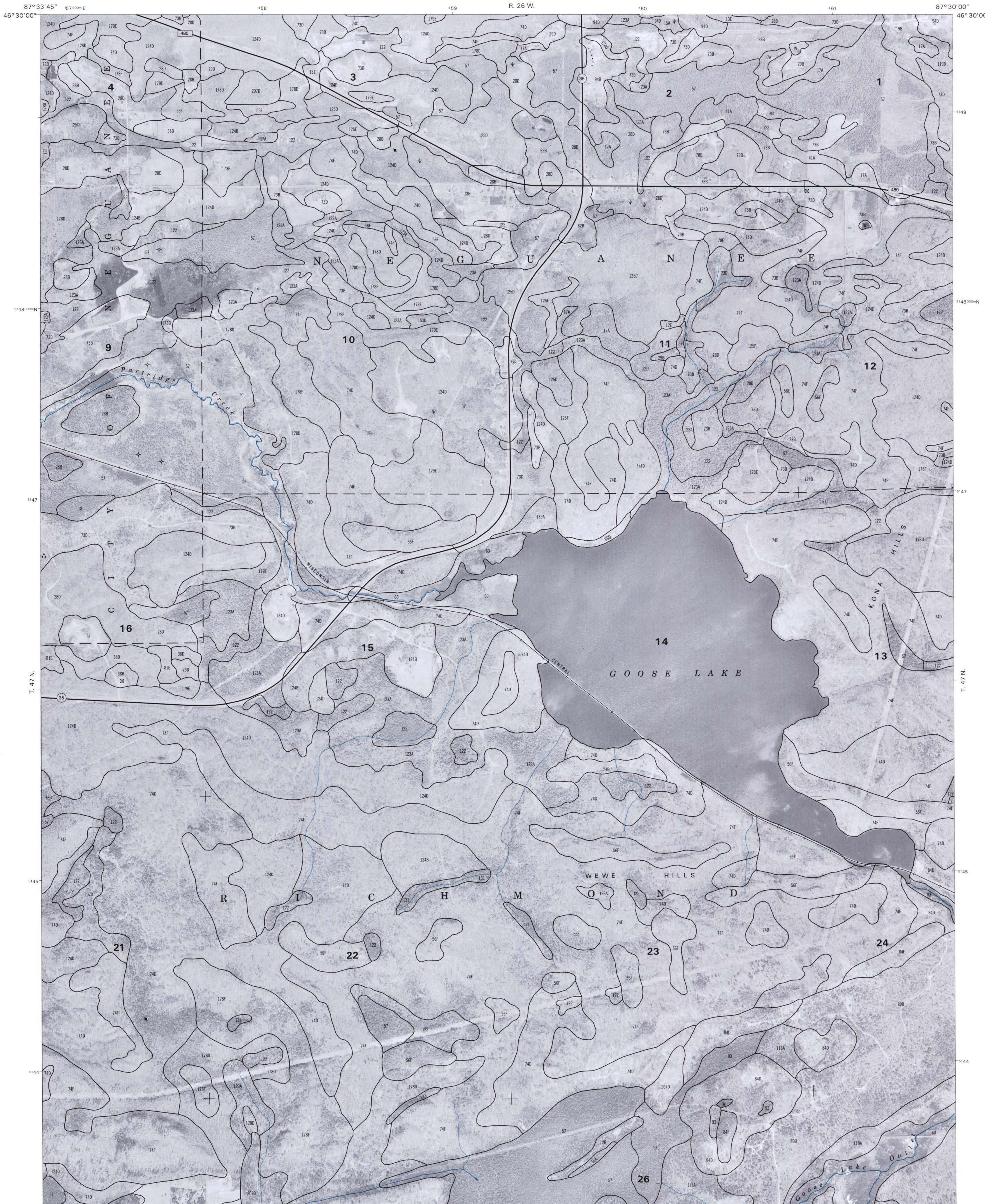
1 NEGAUNEE SW SE (SHEET 32)
2 NEGAUNEE SW (SHEET 33)
3 NEGAUNEE SE (SHEET 34)
4 ISHPEMING NE (SHEET 45)
5 PALMER NE (SHEET 47)
6 ISHPEMING SE (SHEET 60)
7 PALMER SW (SHEET 61)
8 PALMER SE (SHEET 62)

INDEX TO ADJOINING 3.75 MAPS

PALMER NW, MICHIGAN
3.75 MINUTE SERIES

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
PALMER NE QUADRANGLE
SHEET NUMBER 47 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 NEGAUNEE SW (SHEET 33)
2 NEGAUNEE SE (SHEET 34)
3 MARQUETTE SW (SHEET 35)
4 PALMER NW (SHEET 46)
5 SANDS NW (SHEET 48)
6 PALMER SW (SHEET 61)
7 PALMER SE (SHEET 62)
8 SANDS SW (SHEET 63)

INDEX TO ADJOINING 3.75 MAPS

PALMER NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 47 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SANDS NW QUADRANGLE
SHEET NUMBER 48 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

1 NEGAUNEE SE (SHEET 34)
2 MARQUETTE SW (SHEET 35)
3 MARQUETTE SE (SHEET 36)
4 PALMER NE (SHEET 47)
5 SANDS NE (SHEET 49)
6 PALMER SE (SHEET 62)
7 SANDS SW (SHEET 63)
8 SANDS SE (SHEET 64)

INDEX TO ADJOINING 3.75 MAPS

SANDS NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 48 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SANDS NE QUADRANGLE
SHEET NUMBER 49 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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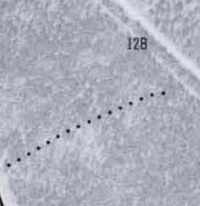
Digital data are available for this quadrangle.

NORTH



QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

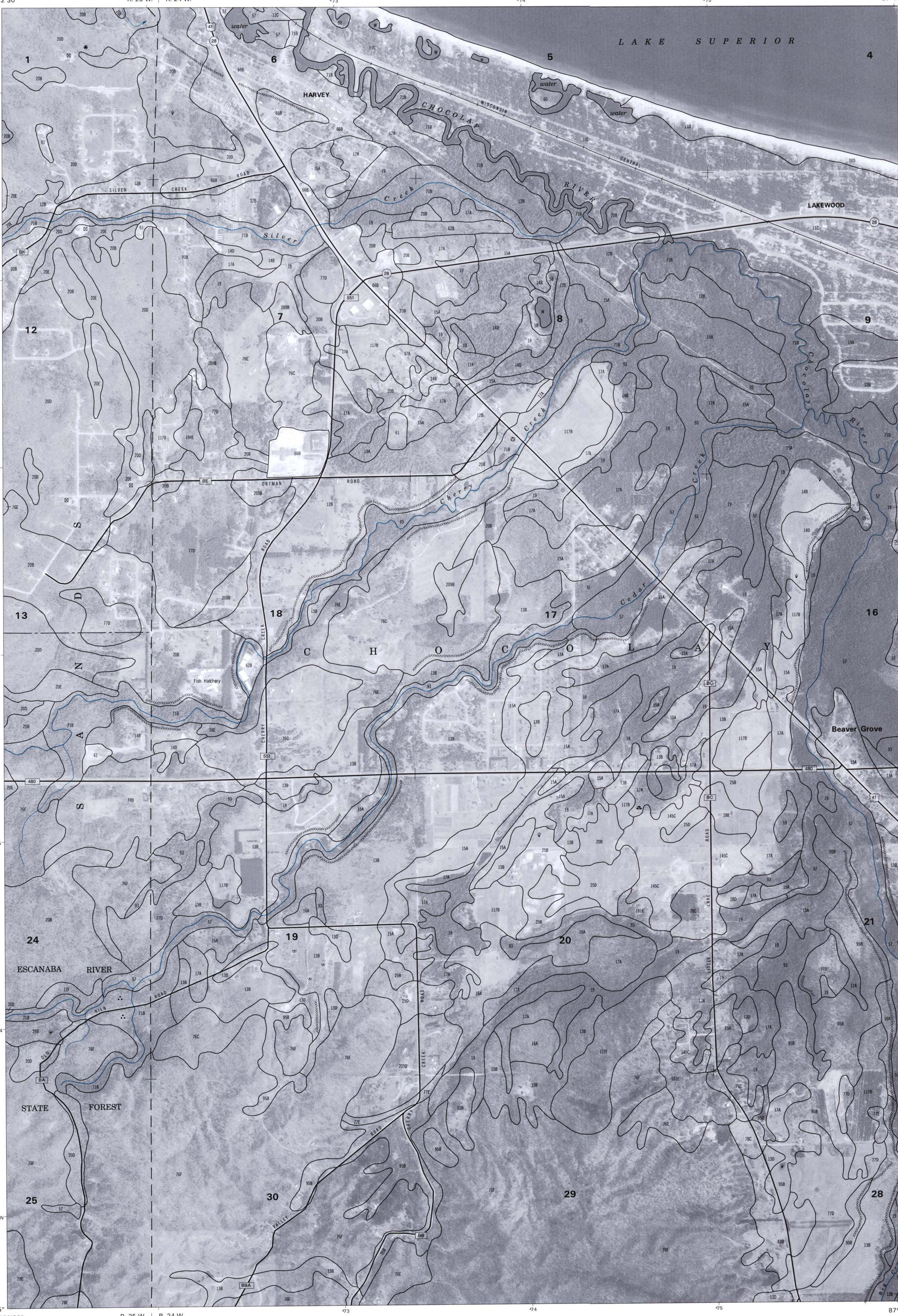
1	2	3
4		5
6	7	8

1 MARQUETTE SW (SHEET 35)
2 MARQUETTE SE (SHEET 36)
3 MARQUETTE OE E SW (SHEET 37)
4 SANDS NW (SHEET 48)
5 HARVEY NW (SHEET 50)
6 SANDS SW (SHEET 63)
7 SANDS SE (SHEET 64)
8 HARVEY SW (SHEET 65)

INDEX TO ADJOINING 3.75 MAPS

SANDS NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 49 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

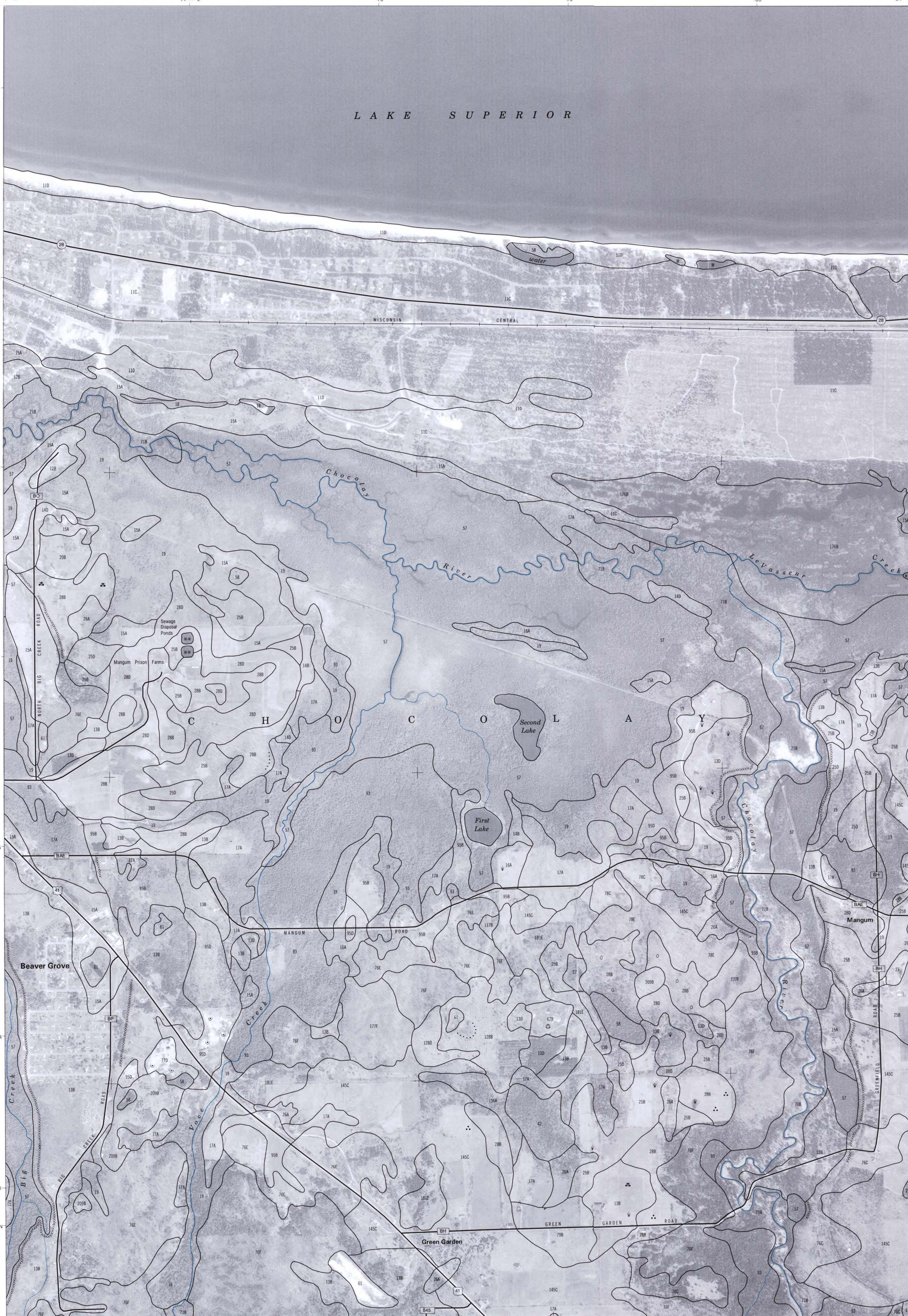
NORTH

QUARTER QUADRANGLE LOCATION

MILES
FEET
KILOMETERS

1 MARQUETTE SE (SHEET 36)
2 MARQUETTE OE E SW (SHEET 37)
3 (ALL WATER)
4 SANDS NE (SHEET 49)
5 HARVEY NE (SHEET 51)
6 SANDS SE (SHEET 64)
7 HARVEY SW (SHEET 65)
8 HARVEY SE (SHEET 66)
INDEX TO ADJOINING 3.75 MAPS

HARVEY NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 50 OF 95



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Land division data are approximately positioned.

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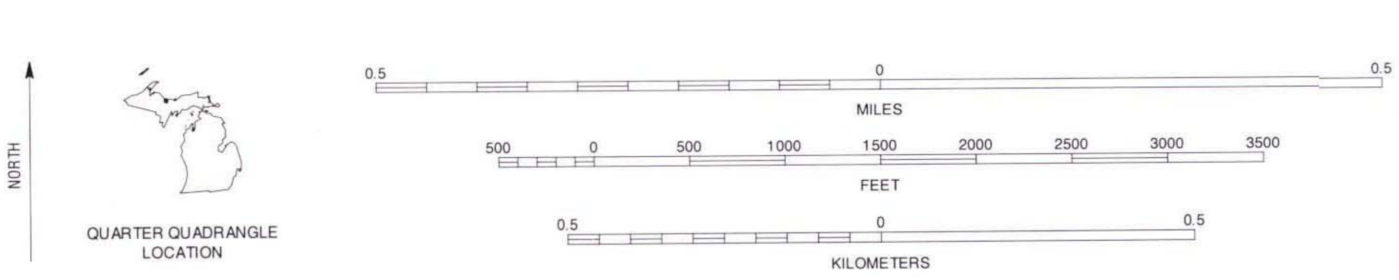
Digital data are available for this quadrangle.



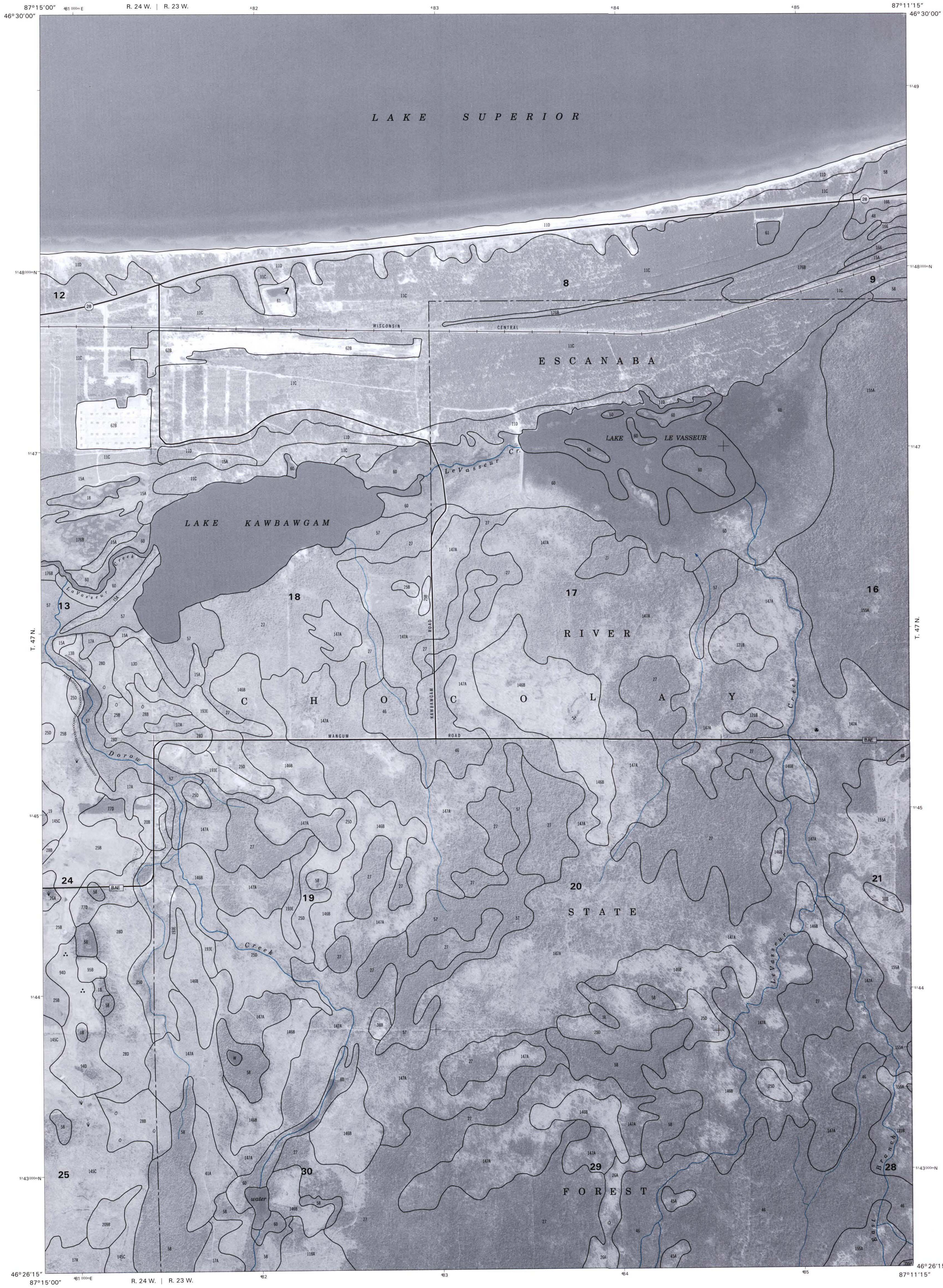
1	2	3
4		5
6	7	8

1 (ALL WATER)
2 (ALL WATER)
3 SHOT POINT SW (SHEET 38)
4 HARVEY NW (SHEET 50)
5 SKANDIA NW (SHEET 52)
6 HARVEY SW (SHEET 65)
7 HARVEY SE (SHEET 66)
8 SKANDIA SW (SHEET 67)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SKANDIA NW QUADRANGLE
SHEET NUMBER 52 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

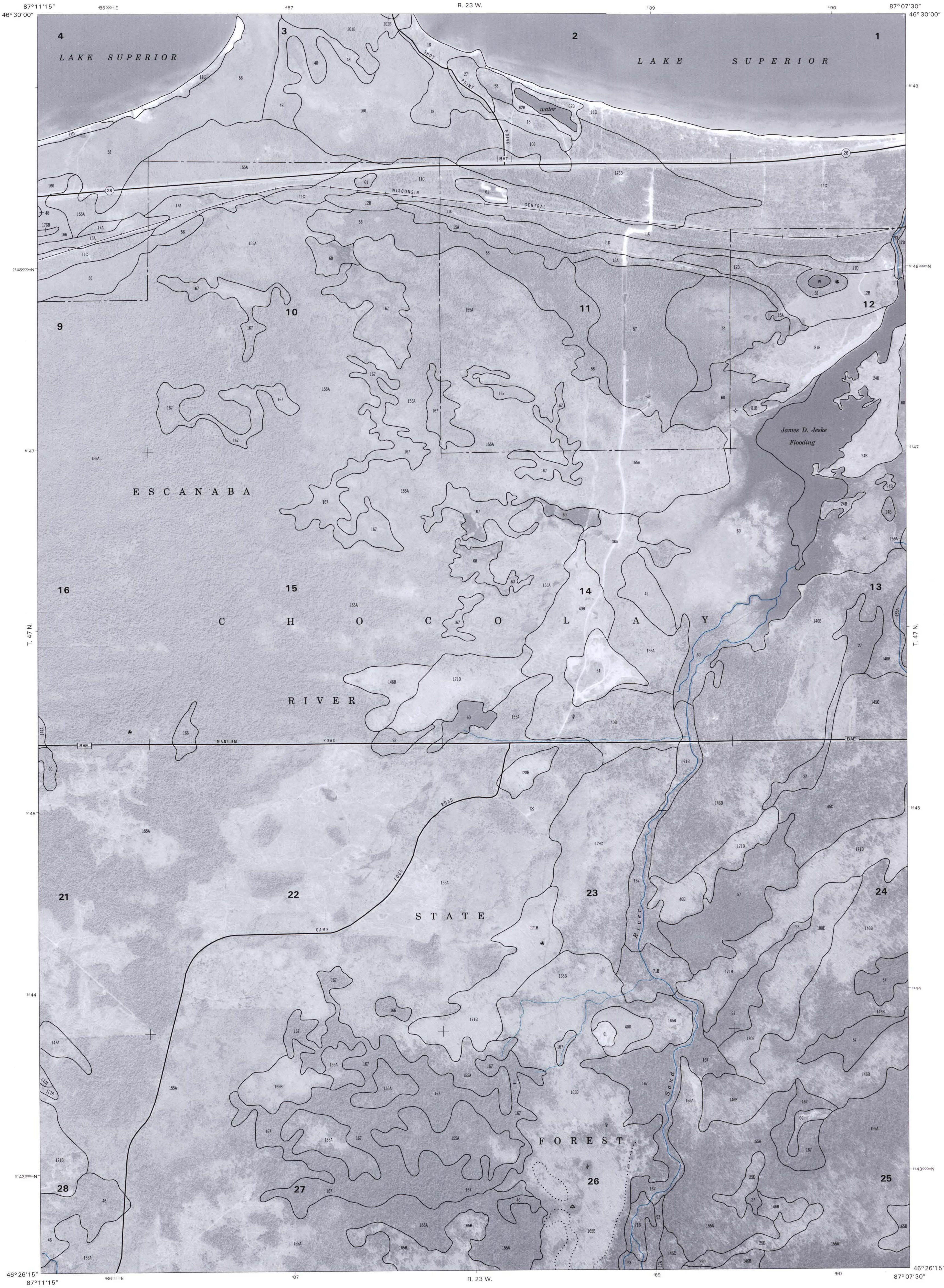
1 (ALL WATER)
2 (ALL WATER)
3 SHOT POINT SE (SHEET 38)
4 HARVEY NE (SHEET 51)
5 SKANDIA NE (SHEET 53)
6 HARVEY SE (SHEET 66)
7 SKANDIA SW (SHEET 67)
8 SKANDIA SE (SHEET 68)

INDEX TO ADJOINING 3.75 MAPS

SKANDIA NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 52 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SKANDIA NE QUADRANGLE
SHEET NUMBER 53 OF 95



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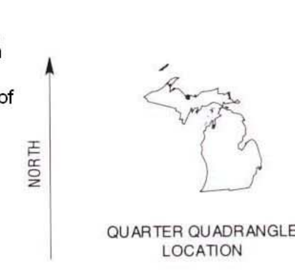
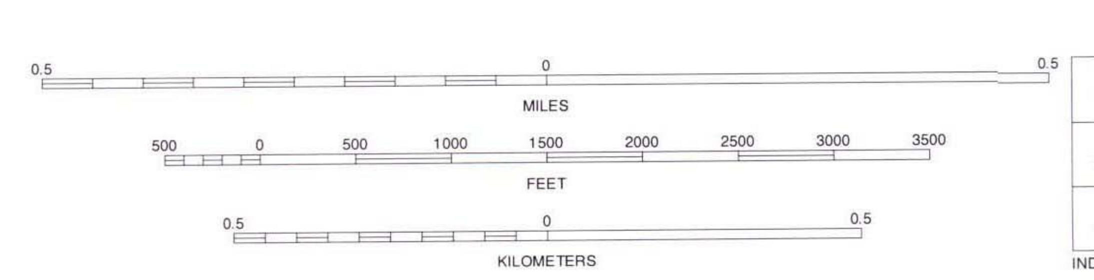


QUARTER QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

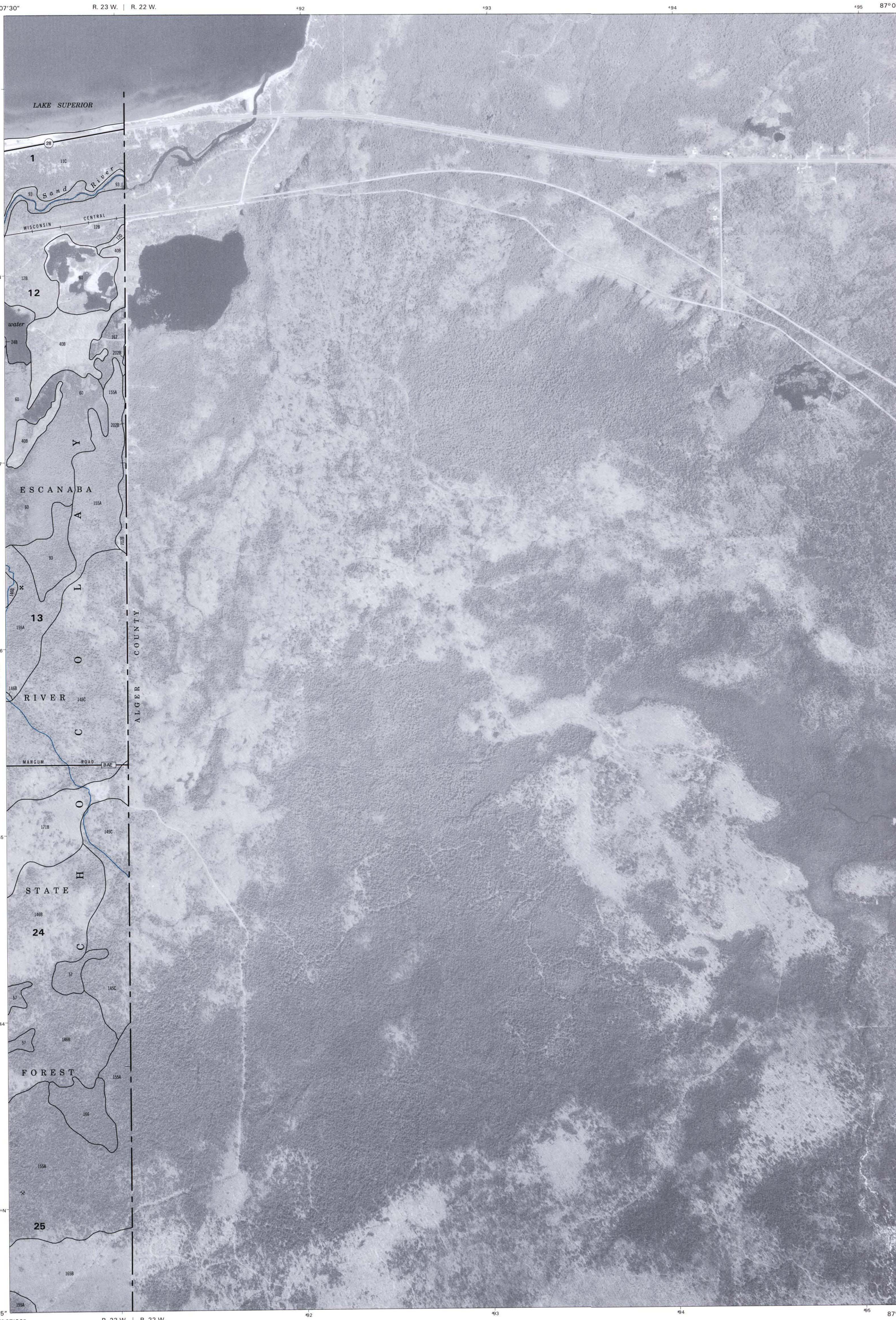
1 (ALL WATER)
2 SHOT POINT SE (SHEET 38)
3 LAUGHING FISH POINT SW (ALGER COUNTY)
4 SKANDIA NW (SHEET 52)
5 SAND RIVER NW (SHEET 54)
6 SKANDIA SW (SHEET 67)
7 SKANDIA SE (SHEET 68)
8 SAND RIVER SW (SHEET 69)

INDEX TO ADJOINING 3.75 MAPS

SKANDIA NE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 53 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SAND RIVER NW QUADRANGLE
SHEET NUMBER 54 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

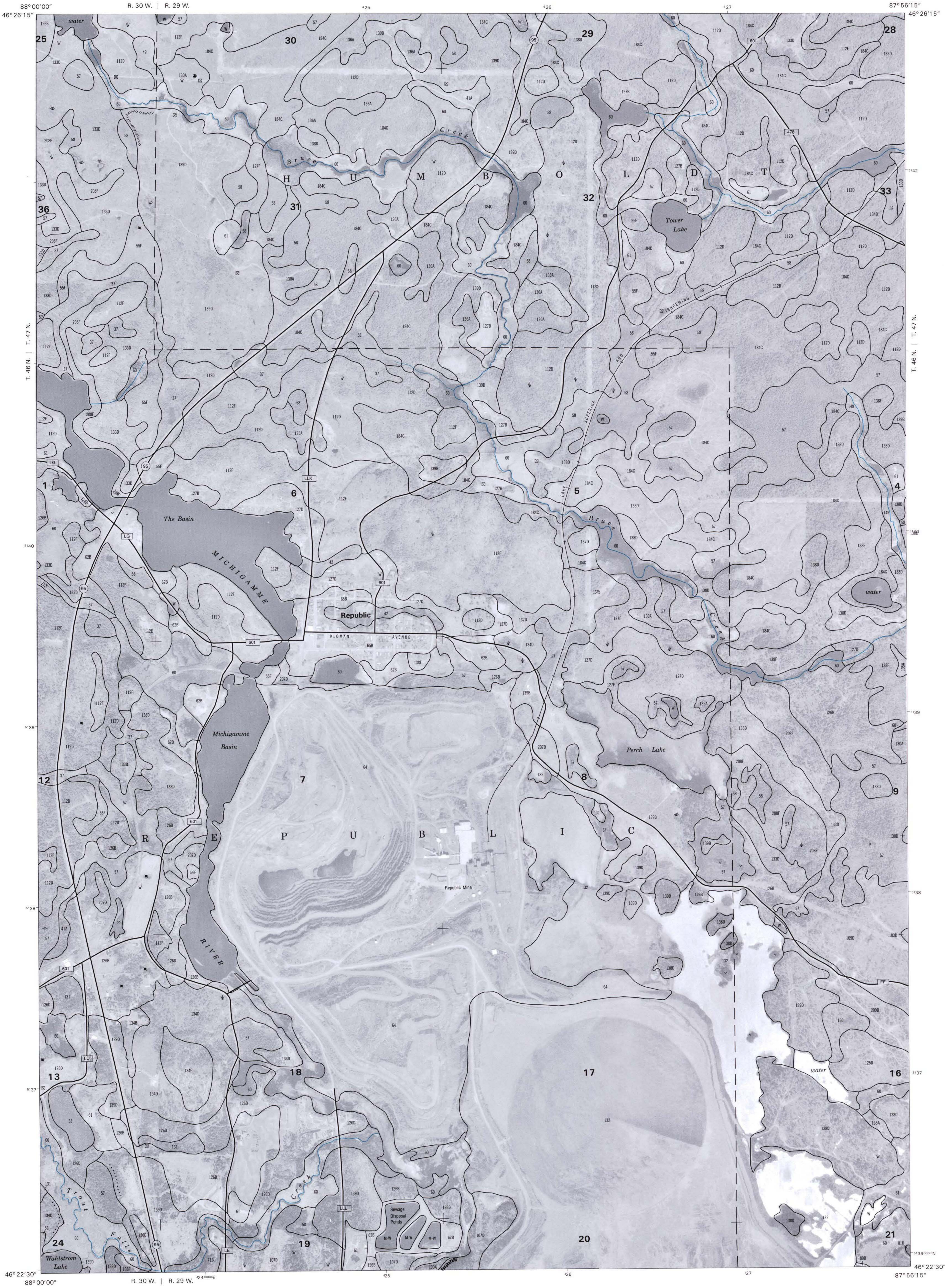
1 SHOT POINT SE (SHEET 38)
2 LAUGHING FISH POINT SW (ALGER COUNTY)
3 LAUGHING FISH POINT SE (ALGER COUNTY)
4 SKANDIA NE (SHEET 53)
5 SAND RIVER NE (ALGER COUNTY)
6 SKANDIA SE (SHEET 68)
7 SAND RIVER SW (SHEET 69)
8 SAND RIVER SE (ALGER COUNTY)

INDEX TO ADJOINING 3.75 MAPS

SAND RIVER NW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 54 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
REPUBLIC SW QUADRANGLE
SHEET NUMBER 55 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

QUARTER QUADRANGLE LOCATION

MILES — FEET — KILOMETERS

INDEX TO ADJOINING 3.75 MAPS

1 WITCH LAKE NE (SHEET 39)
2 REPUBLIC NW (SHEET 40)
3 REPUBLIC NE (SHEET 41)
4 WITCH LAKE NE (SHEET 39)
5 REPUBLIC SE (SHEET 56)
6 WITCH LAKE (SHEET 70)
7 REPUBLIC SW (SHEET 71)
8 REPUBLIC SW (SHEET 71)

REPUBLIC SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 55 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
REPUBLIC SE QUADRANGLE
SHEET NUMBER 56 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 REPUBLIC NW (SHEET 40)
2 REPUBLIC NE (SHEET 41)
3 GREENWOOD NW (SHEET 42)
4 REPUBLIC SW (SHEET 55)
5 GREENWOOD SW (SHEET 57)
6 REPUBLIC SW (SHEET 71)
7 REPUBLIC SW (SHEET 71)
8 CHABENEAU LAKE (SHEET 72)

INDEX TO ADJOINING 3.75 MAPS

REPUBLIC SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 56 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
GREENWOOD SW QUADRANGLE
SHEET NUMBER 57 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 REPUBLIC NE (SHEET 41)
2 GREENWOOD NW (SHEET 42)
3 GREENWOOD NE (SHEET 43)
4 REPUBLIC SE (SHEET 56)
5 GREENWOOD SE (SHEET 58)
6 REPUBLIC SW (SHEET 71)
7 CHABENEAU LAKE (SHEET 72)
8 CHABENEAU LAKE (SHEET 72)

INDEX TO ADJOINING 3.75 MAPS

GREENWOOD SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 57 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
GREENWOOD SE QUADRANGLE
SHEET NUMBER 58 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

1 GREENWOOD NW (SHEET 42)
2 GREENWOOD NE (SHEET 43)
3 ISHPEMING NW (SHEET 44)
4 GREENWOOD SW (SHEET 57)
5 ISHPEMING SW (SHEET 59)
6 CHABENEAU LAKE (SHEET 72)
7 CHABENEAU LAKE (SHEET 72)
8 GREEN HILLS (SHEET 73)

INDEX TO ADJOINING 3.75 MAPS

GREENWOOD SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 58 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

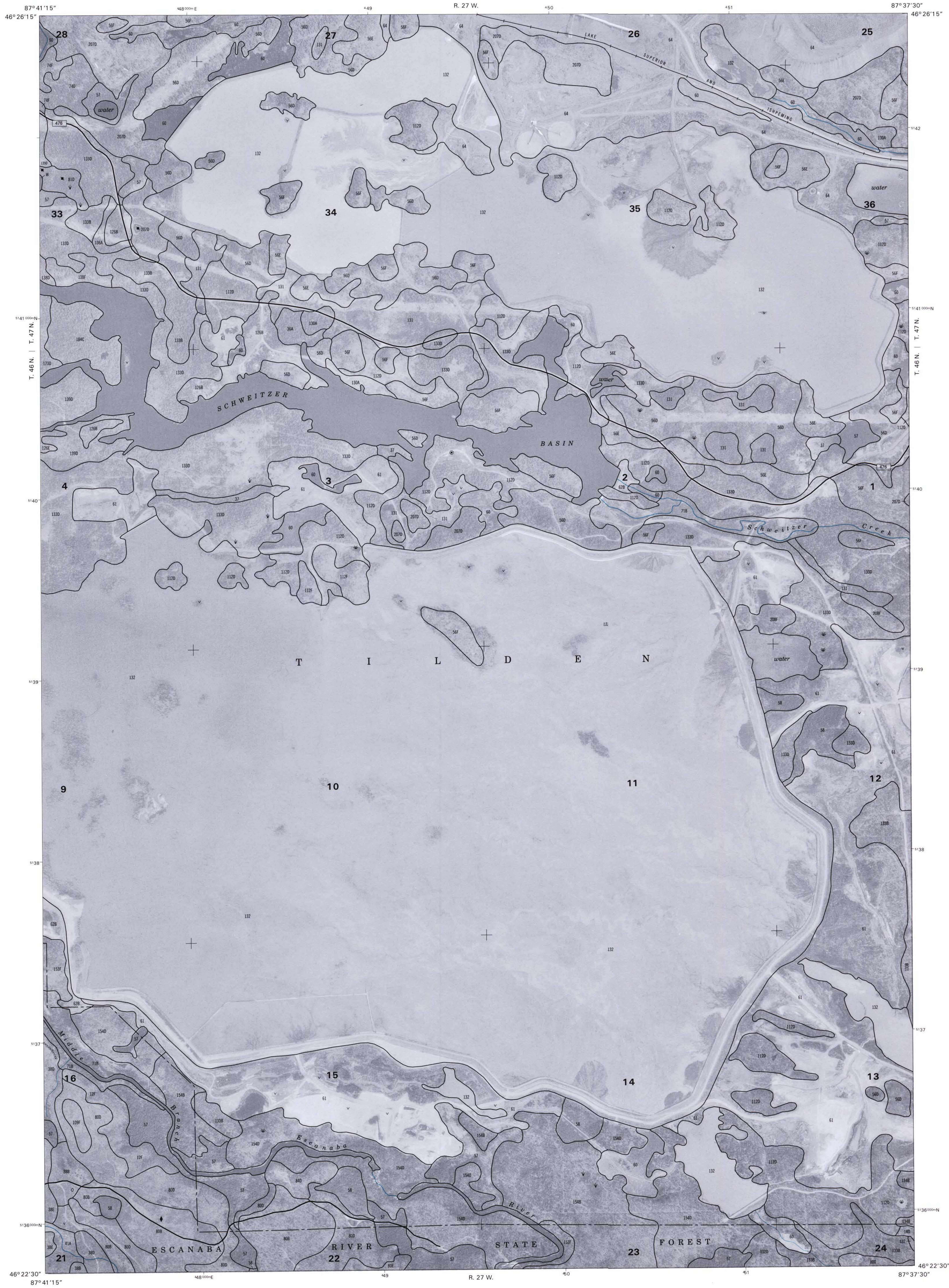
1	2	3
4		5
6	7	8

1 GREENWOOD NE (SHEET 43)
2 ISHPEMING NW (SHEET 44)
3 ISHPEMING NE (SHEET 45)
4 GREENWOOD SE (SHEET 58)
5 ISHPEMING SE (SHEET 60)
6 CHABENEAU LAKE (SHEET 72)
7 GREEN HILLS (SHEET 73)
8 GREEN HILLS (SHEET 73)

INDEX TO ADJOINING 3.75 MAPS

ISHPEMING SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 59 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

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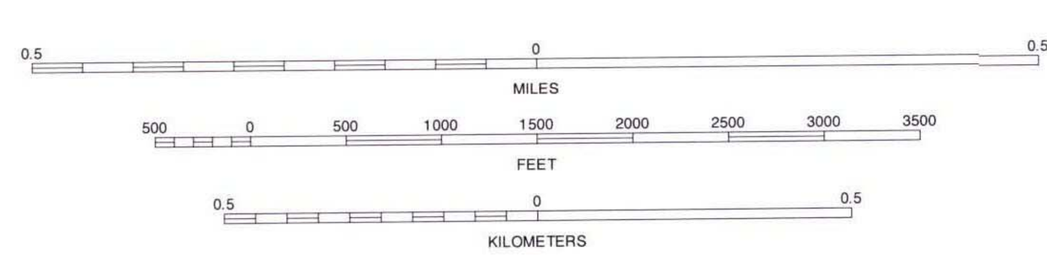
Digital data are available for this quadrangle.

NORTH


QUARTER QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

1 ISHPEMING NW (SHEET 44)
2 ISHPEMING NE (SHEET 45)
3 PALMER NW (SHEET 46)
4 ISHPEMING SW (SHEET 59)
5 PALMER SW (SHEET 61)
6 GREEN HILLS (SHEET 73)
7 GREEN HILLS (SHEET 73)
8 CATARACT BASIN (SHEET 74)

INDEX TO ADJOINING 3.75 MAPS

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 ISHPEMING NE (SHEET 45)
2 PALMER NW (SHEET 46)
3 PALMER NE (SHEET 47)
4 ISHPEMING SE (SHEET 60)
5 PALMER SE (SHEET 62)
6 GREEN HILLS (SHEET 73)
7 CATARACT BASIN (SHEET 74)
8 CATARACT BASIN (SHEET 74)

INDEX TO ADJOINING 3.75 MAPS

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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5
FEET 500 0 500 1000 1500 2000 2500 3000 3500
KILOMETERS 0.5 0 0.5

INDEX TO ADJOINING 3.75 MAPS

1 PALMER NW (SHEET 46)
2 PALMER NE (SHEET 47)
3 SANDS NW (SHEET 48)
4 PALMER SW (SHEET 61)
5 SANDS SW (SHEET 63)
6 CATARACT BASIN (SHEET 74)
7 CATARACT BASIN (SHEET 74)
8 GWINN (SHEET 75)

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 PALMER NE (SHEET 47)
2 SANDS NW (SHEET 48)
3 SANDS NE (SHEET 49)
4 PALMER SE (SHEET 62)
5 SANDS SE (SHEET 64)
6 CATARACT BASIN (SHEET 74)
7 GWINN (SHEET 75)
8 GWINN (SHEET 75)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SANDS SE QUADRANGLE
SHEET NUMBER 64 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 SANDS NW (SHEET 48)
2 SANDS NE (SHEET 49)
3 HARVEY NW (SHEET 50)
4 SANDS SW (SHEET 63)
5 HARVEY SW (SHEET 65)
6 GWINN (SHEET 75)
7 GWINN (SHEET 75)
8 LITTLE LAKE (SHEET 76)

INDEX TO ADJOINING 3.75 MAPS

SANDS SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 64 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES 0.5 0 0.5

FEET 500 0 500 1000 1500 2000 2500 3000 3500

KILOMETERS 0.5 0 0.5

1	2	3
4		5
6	7	8

1 SANDS NE (SHEET 49)
2 HARVEY NW (SHEET 50)
3 HARVEY NE (SHEET 51)
4 SANDS SE (SHEET 64)
5 HARVEY SE (SHEET 66)
6 GWINN (SHEET 75)
7 LITTLE LAKE (SHEET 76)
8 LITTLE LAKE (SHEET 76)

INDEX TO ADJOINING 3.75 MAPS

HARVEY SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 65 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
HARVEY SE QUADRANGLE
SHEET NUMBER 66 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5 MILES

500 0 500 1000 1500 2000 2500 3000 3500 FEET

0.5 0 0.5 KILOMETERS

1	2	3
4		5
6	7	8

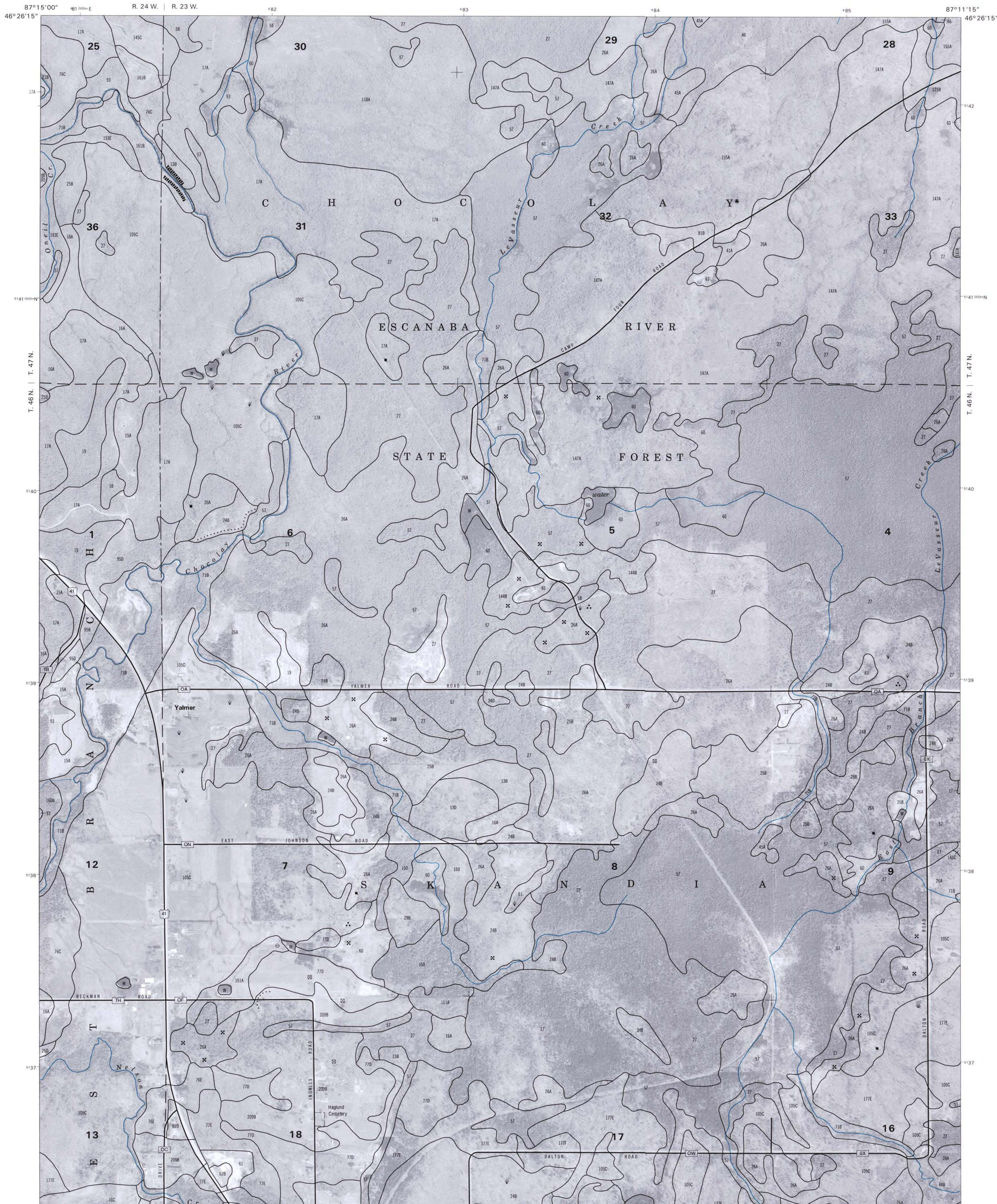
1 HARVEY NW (SHEET 50)
2 HARVEY NE (SHEET 51)
3 SKANDIA NW (SHEET 52)
4 HARVEY SW (SHEET 65)
5 SKANDIA SW (SHEET 67)
6 LITTLE LAKE (SHEET 76)
7 LITTLE LAKE (SHEET 76)
8 CARLSHEND (SHEET 77)

INDEX TO ADJOINING 3.75 MAPS

HARVEY SE, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 66 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SKANDIA SW QUADRANGLE
SHEET NUMBER 67 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

MILES: 0.5 — 0 — 0.5

FEET: 500 — 0 — 500 — 1000 — 1500 — 2000 — 2500 — 3000 — 3500

KILOMETERS: 0.5 — 0 — 0.5

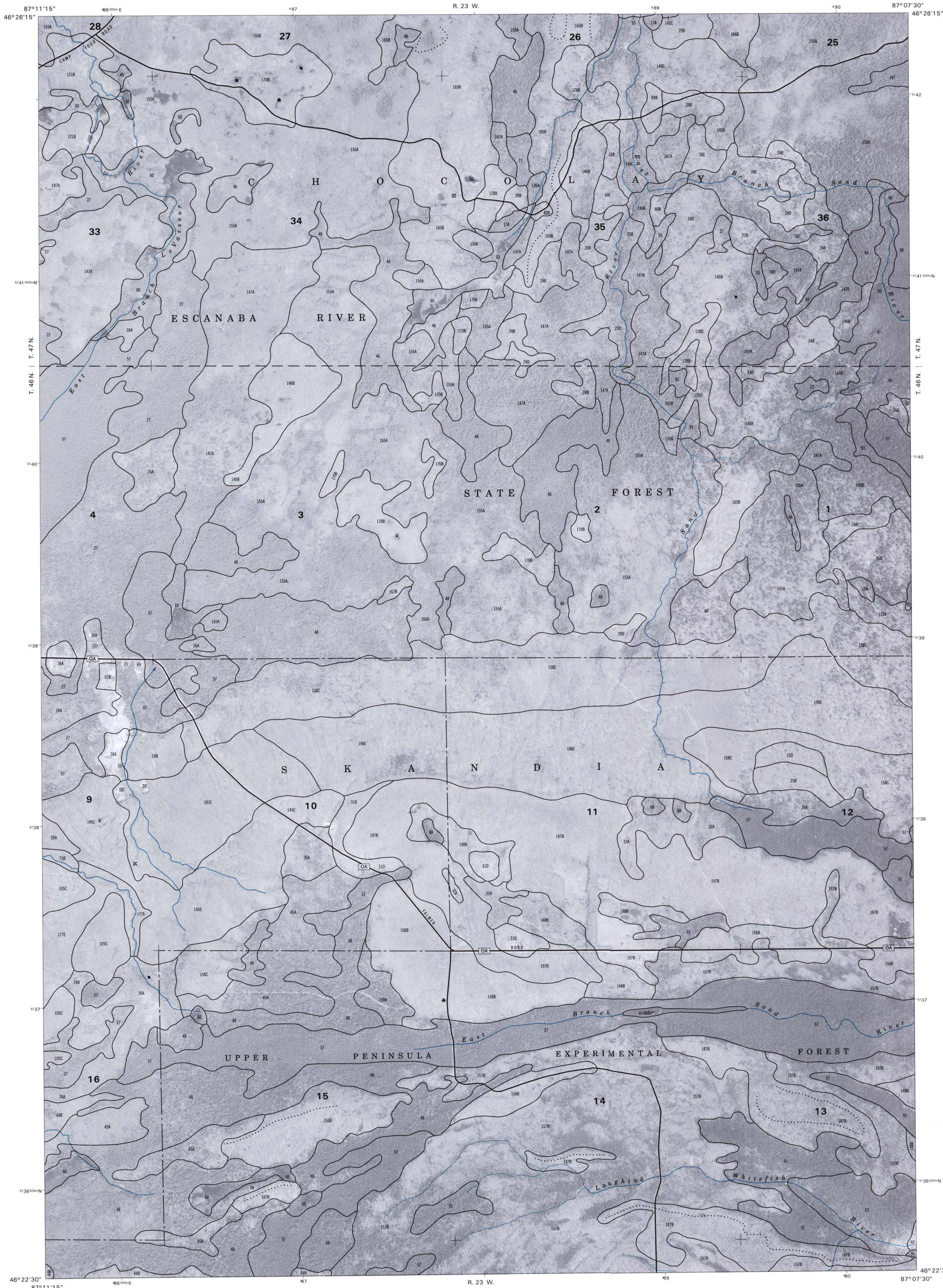
1	2	3
4		5
6	7	8

1 HARVEY NE (SHEET 51)
2 SKANDIA NW (SHEET 52)
3 SKANDIA NE (SHEET 53)
4 HARVEY SE (SHEET 66)
5 SKANDIA SE (SHEET 68)
6 LITTLE LAKE (SHEET 76)
7 CARLSHEND (SHEET 77)
8 CARLSHEND (SHEET 77)

INDEX TO ADJOINING 3.75 MAPS

SKANDIA SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 67 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

1	2	3
4		5
6	7	8

1 SKANDIA NW (SHEET 52)
2 SKANDIA NE (SHEET 53)
3 SAND RIVER NW (SHEET 54)
4 SKANDIA SW (SHEET 67)
5 SAND RIVER SW (SHEET 69)
6 CARLSHEND (SHEET 77)
7 CARLSHEND (SHEET 77)
8 LADOGA (SHEET 78)

INDEX TO ADJOINING 3.75 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
SAND RIVER SW QUADRANGLE
SHEET NUMBER 69 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUARTER QUADRANGLE LOCATION

0.5 0 0.5
MILES

500 0 500 1000 1500 2000 2500 3000 3500
FEET

0.5 0 0.5
KILOMETERS

1	2	3
4		5
6	7	8

1 SKANDIA NE (SHEET 53)
2 SAND RIVER NW (SHEET 54)
3 SAND RIVER NE (ALGER COUNTY)
4 SKANDIA SE (SHEET 68)
5 SAND RIVER SE (ALGER COUNTY)
6 CARLSHEND (SHEET 77)
7 LADOGA (SHEET 78)
8 LADOGA (SHEET 78)

INDEX TO ADJOINING 3.75 MAPS

SAND RIVER SW, MICHIGAN
3.75 MINUTE SERIES
SHEET NUMBER 69 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
WITCH LAKE QUADRANGLE
SHEET NUMBER 70 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

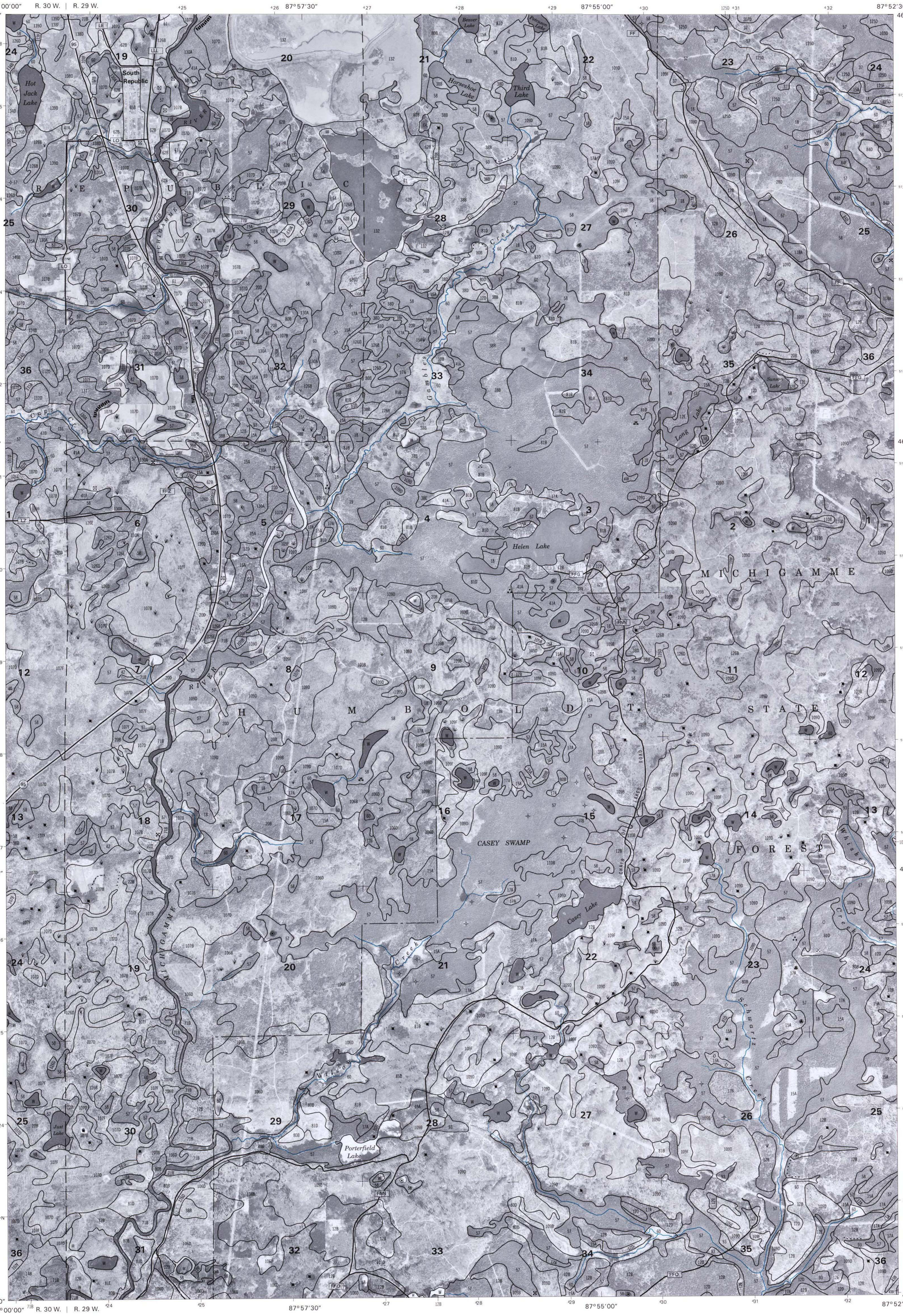
1 NELSON LAKE (IRON COUNTY)
2 WITCH LAKE NE (SHEET 39)
3 REPUBLIC (SHEETS 40 AND 55)
4 HICKMAN LAKE (IRON COUNTY)
5 REPUBLIC SW (SHEET 71)
6 KIERNAN (IRON COUNTY)
7 CHANNING (SHEET 79)
8 RALPH NW (SHEET 80)

INDEX TO ADJOINING 7.5 MAPS

WITCH LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 70 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
REPUBLIC SW QUADRANGLE
SHEET NUMBER 71 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

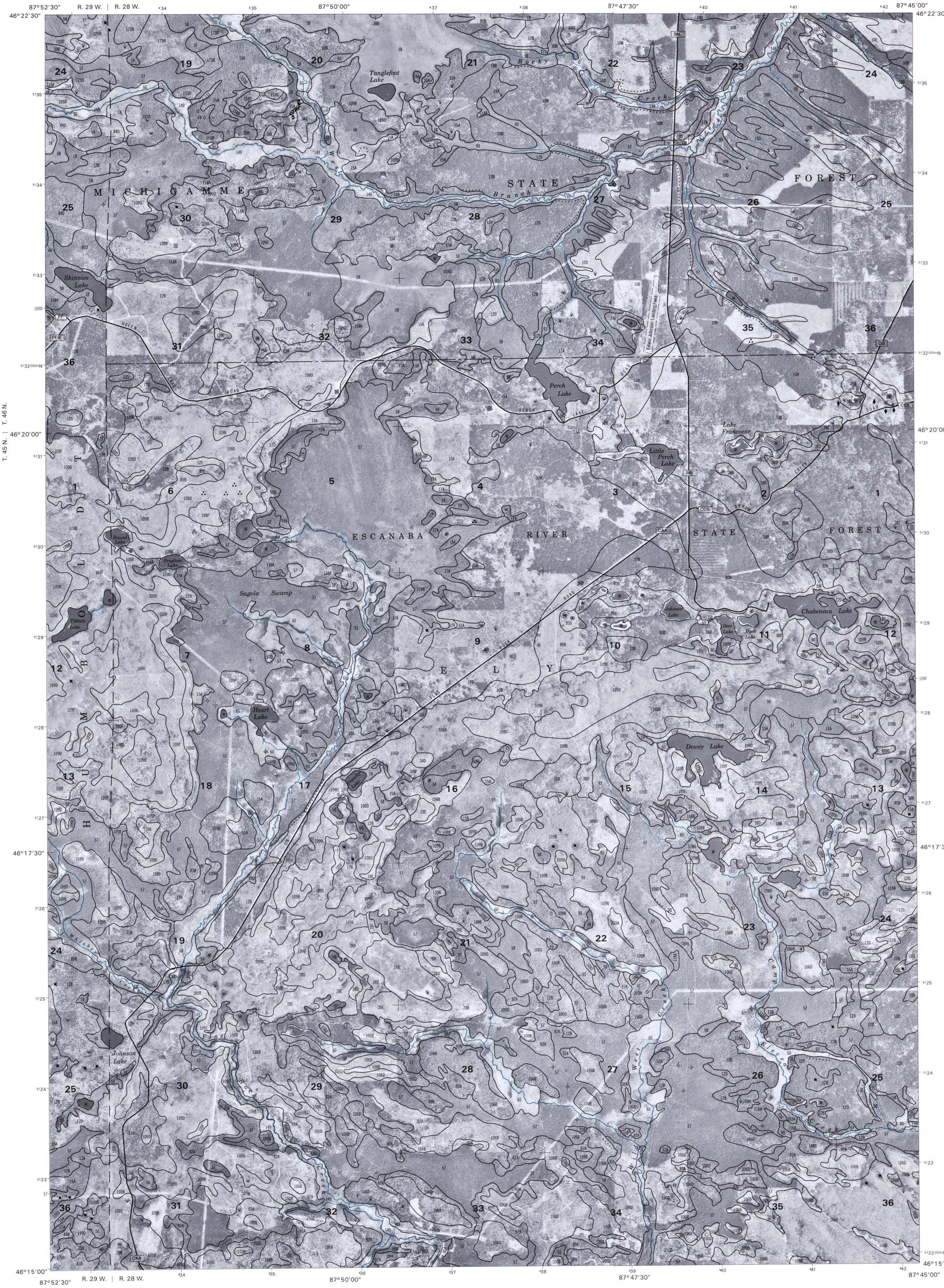
1 WITCH LAKE NE (SHEET 39)
2 REPUBLIC (SHEETS 40, 41, 55, 56)
3 GREENWOOD (SHEETS 42, 43, 57, 58)
4 WITCH LAKE (SHEET 70)
5 CHABENEAU LAKE (SHEET 72)
6 CHANNING (SHEET 79)
7 RALPH NW (SHEET 80)
8 RALPH NE (SHEET 81)

INDEX TO ADJOINING 7.5 MAPS

REPUBLIC SW, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 71 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
CHABENEAU LAKE QUADRANGLE
SHEET NUMBER 72 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 REPUBLIC (SHEET 56)
2 GREENWOOD (SHEETS 57 AND 58)
3 ISHPEMING (SHEET 59)
4 REPUBLIC SW (SHEET 71)
5 GREEN HILLS (SHEET 73)
6 RALPH NW (SHEET 80)
7 RALPH NE (SHEET 81)
8 NORTHLAND NW (SHEET 82)

INDEX TO ADJOINING 7.5 MAPS

CHABENEAU LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 72 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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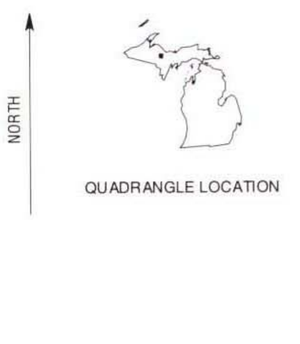
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.



MILES

FEET

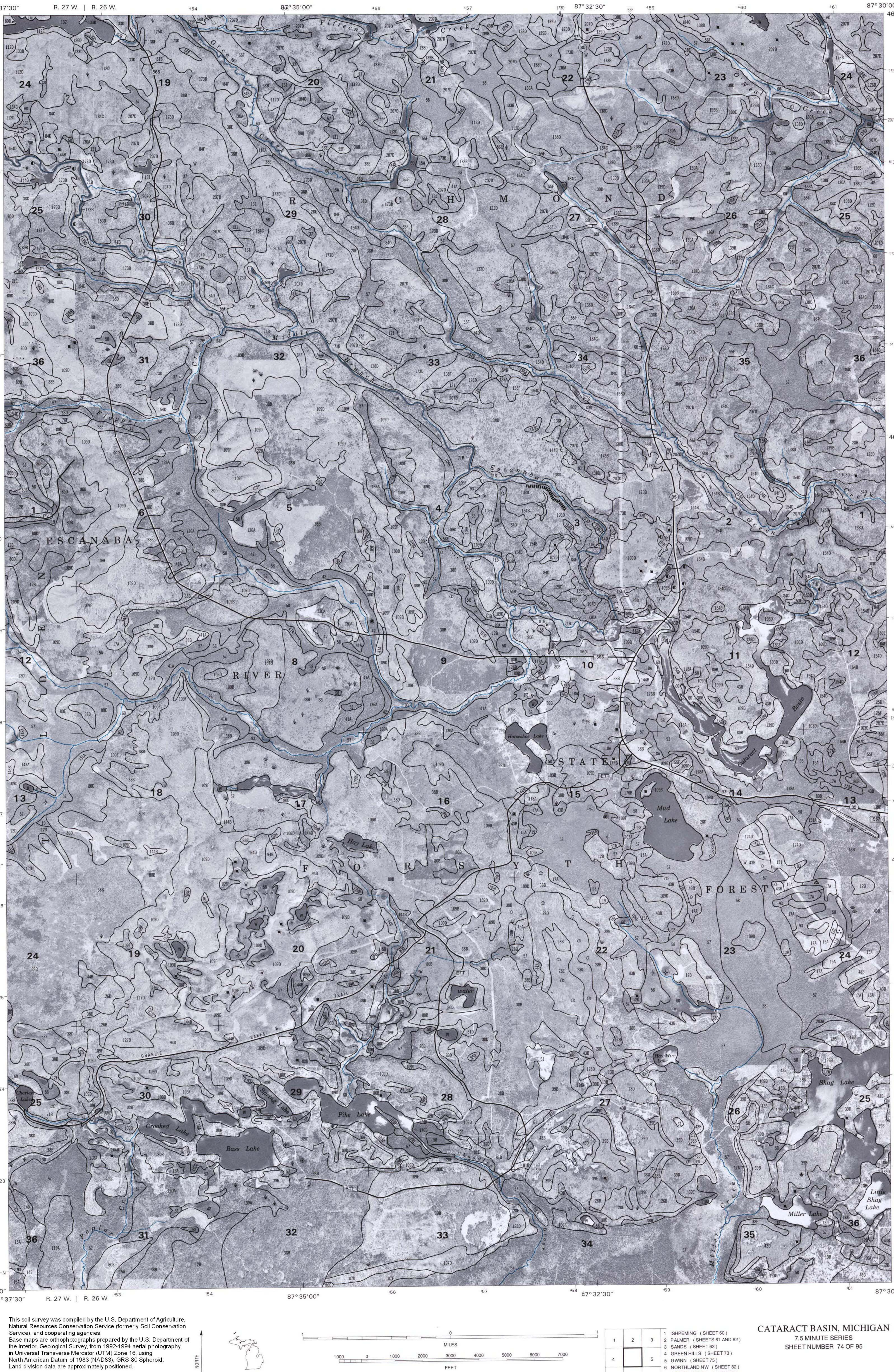
KILOMETERS

1	2	3
4		5
6	7	8

1 GREENWOOD (SHEET 58)
2 ISHPEMING (SHEETS 59 AND 60)
3 PALMER (SHEET 61)
4 CHABENEAU LAKE (SHEET 72)
5 CATARACT BASIN (SHEET 74)
6 RALPH NE (SHEET 81)
7 NORTHLAND NW (SHEET 82)
8 NORTHLAND NE (SHEET 83)

INDEX TO ADJOINING 7.5 MAPS

GREEN HILLS, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 73 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 ISHPEMING (SHEET 60)
2 PALMER (SHEETS 61 AND 62)
3 SANDS (SHEET 63)
4 GREEN HILLS (SHEET 73)
5 GWINN (SHEET 75)
6 NORTHLAND NW (SHEET 82)
7 NORTHLAND NE (SHEET 83)
8 ANDERSON LAKE (SHEET 84)

INDEX TO ADJOINING 7.5 MAPS

CATARACT BASIN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 74 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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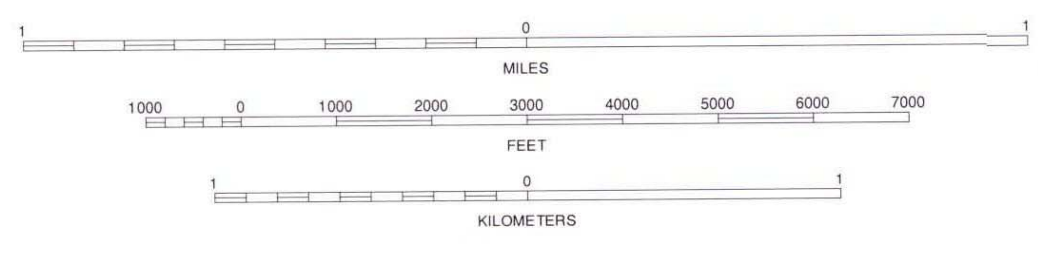
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

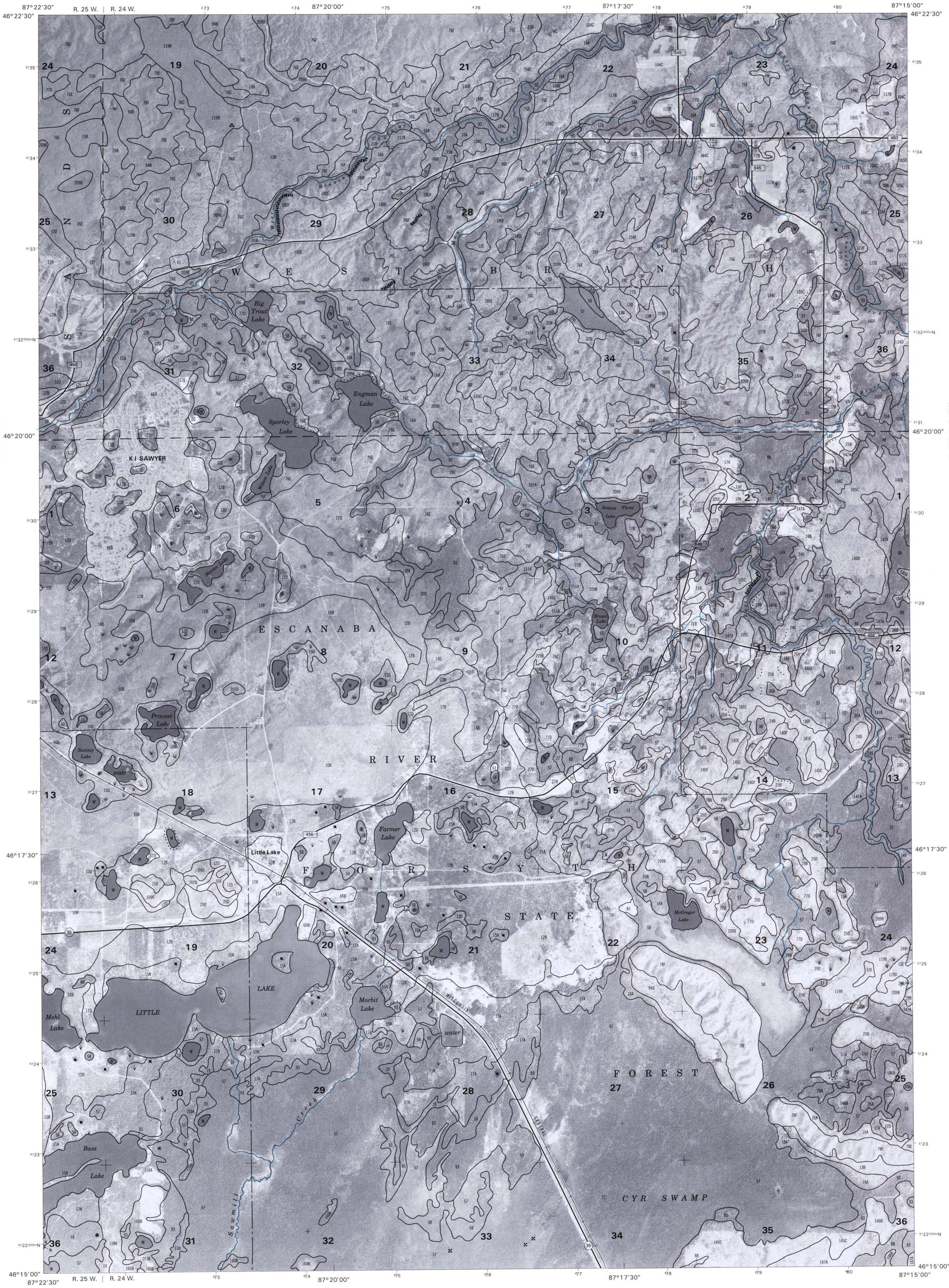
1 PALMER (SHEETS 61 AND 62)
2 SANDS (SHEETS 63 AND 64)
3 HARVEY (SHEETS 65 AND 66)
4 CATARACT BASIN (SHEET 74)
5 LITTLE LAKE (SHEET 76)
6 NORTHLAND NE (SHEET 83)
7 ANDERSON LAKE (SHEET 84)
8 HELENA (SHEET 85)

INDEX TO ADJOINING 7.5 MAPS

GWINN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 75 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
LITTLE LAKE QUADRANGLE
SHEET NUMBER 76 OF 95



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Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 SANDS (SHEETS 63 AND 64)
2 HARVEY (SHEETS 65 AND 66)
3 SKANDIA (SHEETS 67 AND 68)
4 GWINN (SHEET 75)
5 CARLSHEND (SHEET 77)
6 ANDERSON LAKE (SHEET 84)
7 HELENA (SHEET 85)
8 MCFARLAND (SHEET 86)

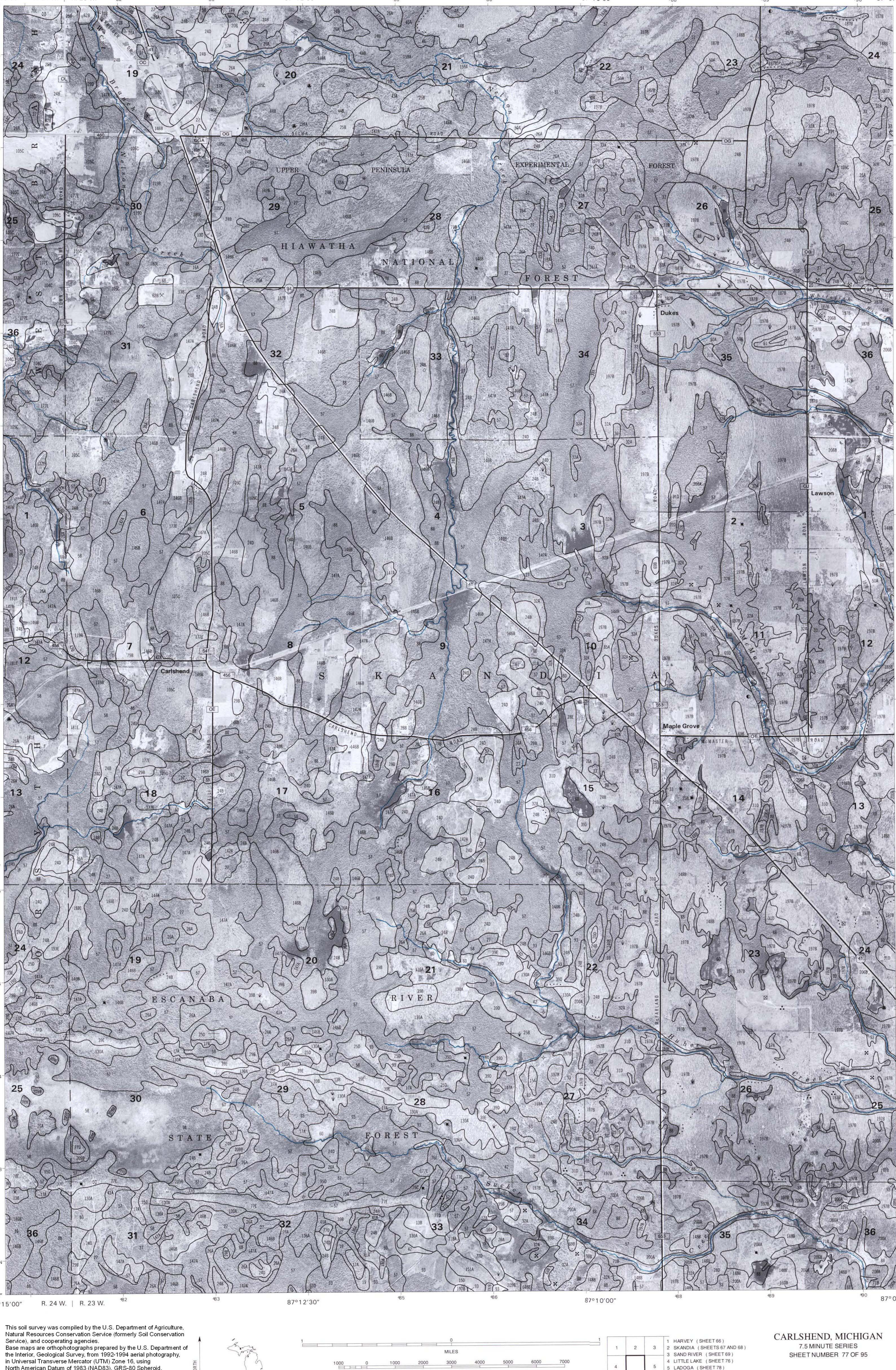
INDEX TO ADJOINING 7.5 MAPS

LITTLE LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 76 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
CARLSHEND QUADRANGLE
SHEET NUMBER 77 OF 95

87°15'00" R. 24 W. | R. 23 W. 87°12'30" 87°10'00" 87°07'30"
46°22'30"



46°15'00"
87°15'00" R. 24 W. | R. 23 W. 87°12'30" 87°10'00" 87°07'30"

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

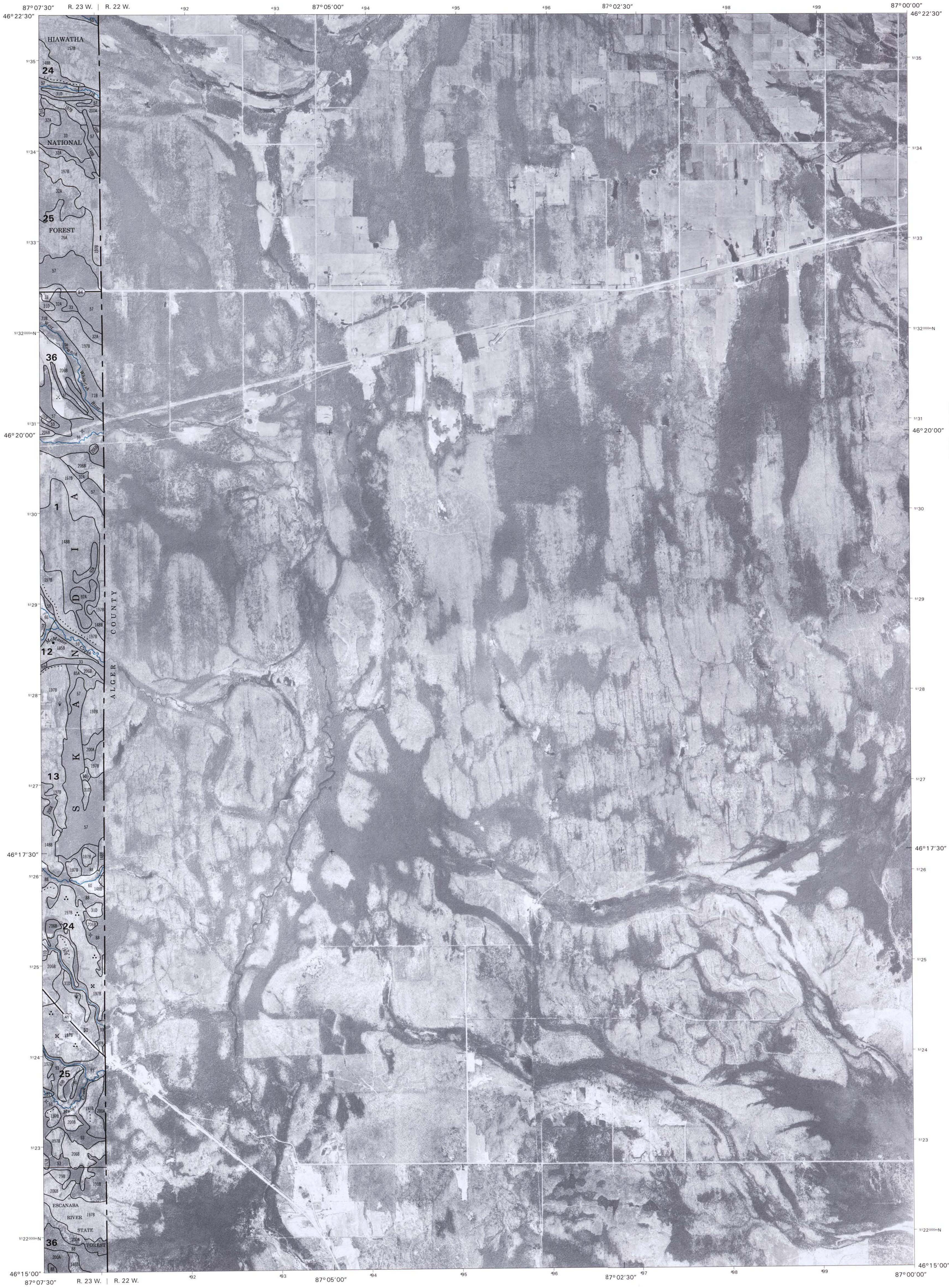
KILOMETERS

INDEX TO ADJOINING 7.5 MAPS

1 HARVEY (SHEET 66)
2 SKANDIA (SHEETS 67 AND 68)
3 SAND RIVER (SHEET 69)
4 LITTLE LAKE (SHEET 76)
5 LADOGA (SHEET 78)
6 HELENA (SHEET 85)
7 MCFARLAND (SHEET 86)
8 DIFFIN (SHEET 87)

CARLSHEND, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 77 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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Land division data are approximately positioned.

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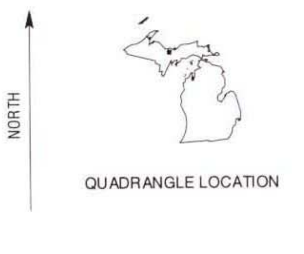
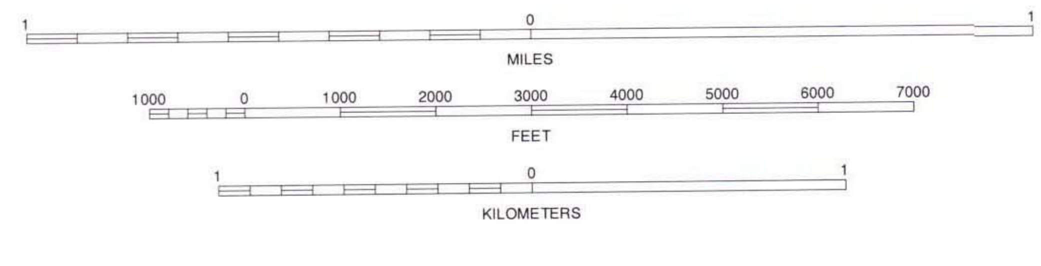
Digital data are available for this quadrangle.





1	2	3
4		5
6	7	8

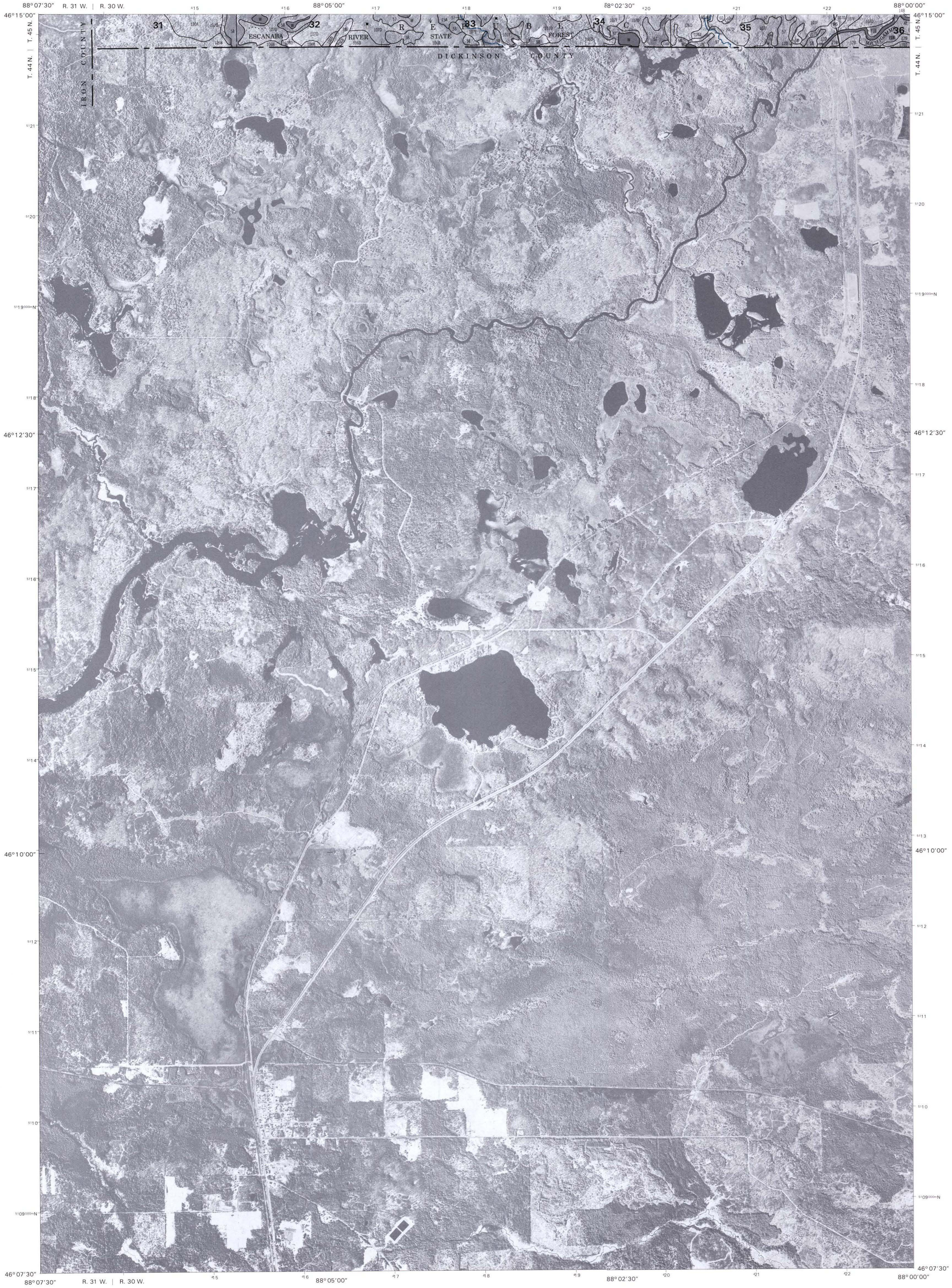
1 SKANDIA (SHEETS 67 AND 68)
2 SAND RIVER (SHEET 69)
3 ROCK RIVER (ALGER COUNTY)
4 CARLSHEND (SHEET 77)
5 CHATHAM (ALGER COUNTY)
6 MCFARLAND (SHEET 86)
7 DIFFIN (SHEET 87)
8 TRENARY (ALGER COUNTY)

INDEX TO ADJOINING 7.5 MAPS

LADOGA, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 78 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
CHANNING QUADRANGLE
SHEET NUMBER 79 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 HICKMAN LAKE (IRON COUNTY)
2 WITCH LAKE (SHEET 70)
3 REPUBLIC SW (SHEET 71)
4 KIERNAN (IRON COUNTY)
5 RALPH NW (SHEET 80)
6 LAKE MARY (IRON COUNTY)
7 SAGOLA (DICKINSON COUNTY)
8 RALPH SW (DICKINSON COUNTY)

INDEX TO ADJOINING 7.5 MAPS

CHANNING, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 79 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES: 1 — 0 — 1

FEET: 1000 0 1000 2000 3000 4000 5000 6000 7000

KILOMETERS: 1 — 0 — 1

INDEX TO ADJOINING 7.5 MAPS

1 WITCH LAKE (SHEET 70)
2 REPUBLIC SW (SHEET 71)
3 CHABENEAU LAKE (SHEET 72)
4 CHANNING (SHEET 79)
5 RALPH NE (SHEET 81)
6 SAGOLA (DICKINSON COUNTY)
7 RALPH SW (DICKINSON COUNTY)
8 RALPH (DICKINSON COUNTY)

RALPH NW, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 80 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
RALPH NE QUADRANGLE
SHEET NUMBER 81 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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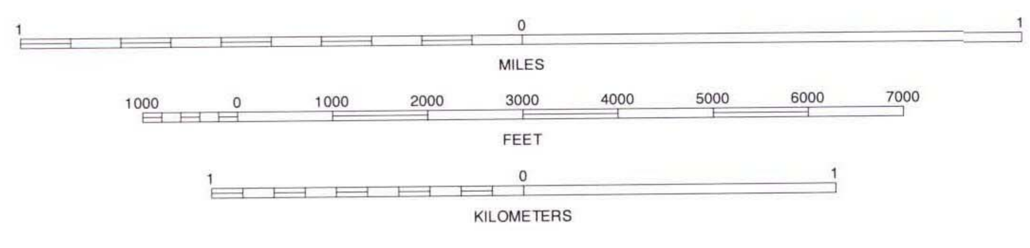
Digital data are available for this quadrangle.

QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

1 REPUBLIC SW (SHEET 71)
2 CHABENEAU LAKE (SHEET 72)
3 GREEN HILLS (SHEET 73)
4 RALPH NW (SHEET 80)
5 NORTHLAND NW (SHEET 82)
6 RALPH SW (DICKINSON COUNTY)
7 RALPH (DICKINSON COUNTY)
8 ALFRED (DICKINSON COUNTY)

INDEX TO ADJOINING 7.5 MAPS

RALPH NE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 81 OF 95

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 CHABENEAU LAKE (SHEET 72)
2 GREEN HILLS (SHEET 73)
3 CATARACT BASIN (SHEET 74)
4 RALPH NE (SHEET 81)
5 NORTHLAND NE (SHEET 83)
6 RALPH (DICKINSON COUNTY)
7 ALFRED (DICKINSON COUNTY)
8 NORTHLAND (SHEET 88)

INDEX TO ADJOINING 7.5 MAPS

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NORTHLAND NE QUADRANGLE
SHEET NUMBER 83 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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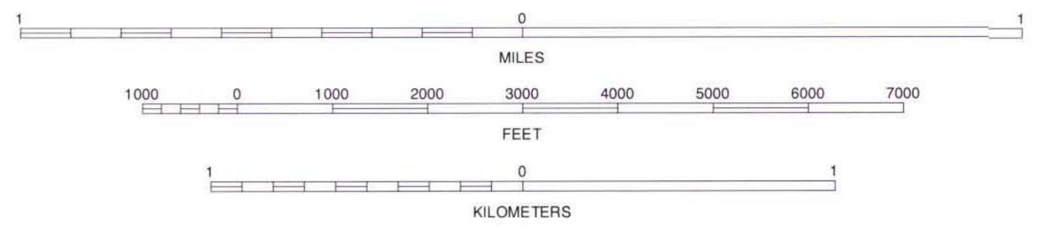
Digital data are available for this quadrangle.

QUADRANGLE LOCATION



1	2	3
4		5
6	7	8

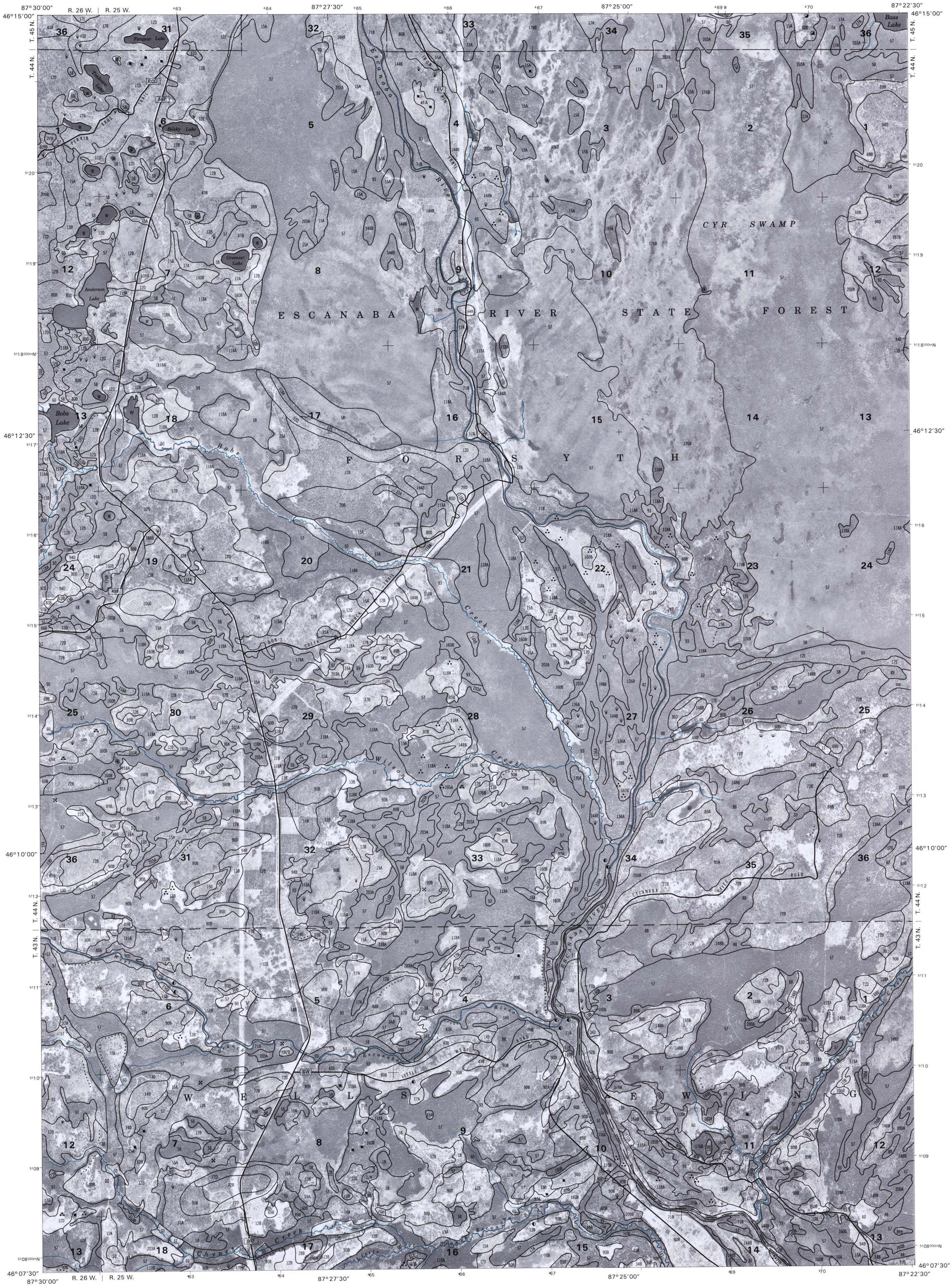
1 GREEN HILLS (SHEET 73)
2 CATARACT BASIN (SHEET 74)
3 GWINN (SHEET 75)
4 NORTHLAND NW (SHEET 82)
5 ANDERSON LAKE (SHEET 84)
6 ALFRED (DICKINSON COUNTY)
7 NORTHLAND (SHEET 88)
8 ARNOLD (SHEET 89)

INDEX TO ADJOINING 7.5 MAPS

NORTHLAND NE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 83 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
ANDERSON LAKE QUADRANGLE
SHEET NUMBER 84 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

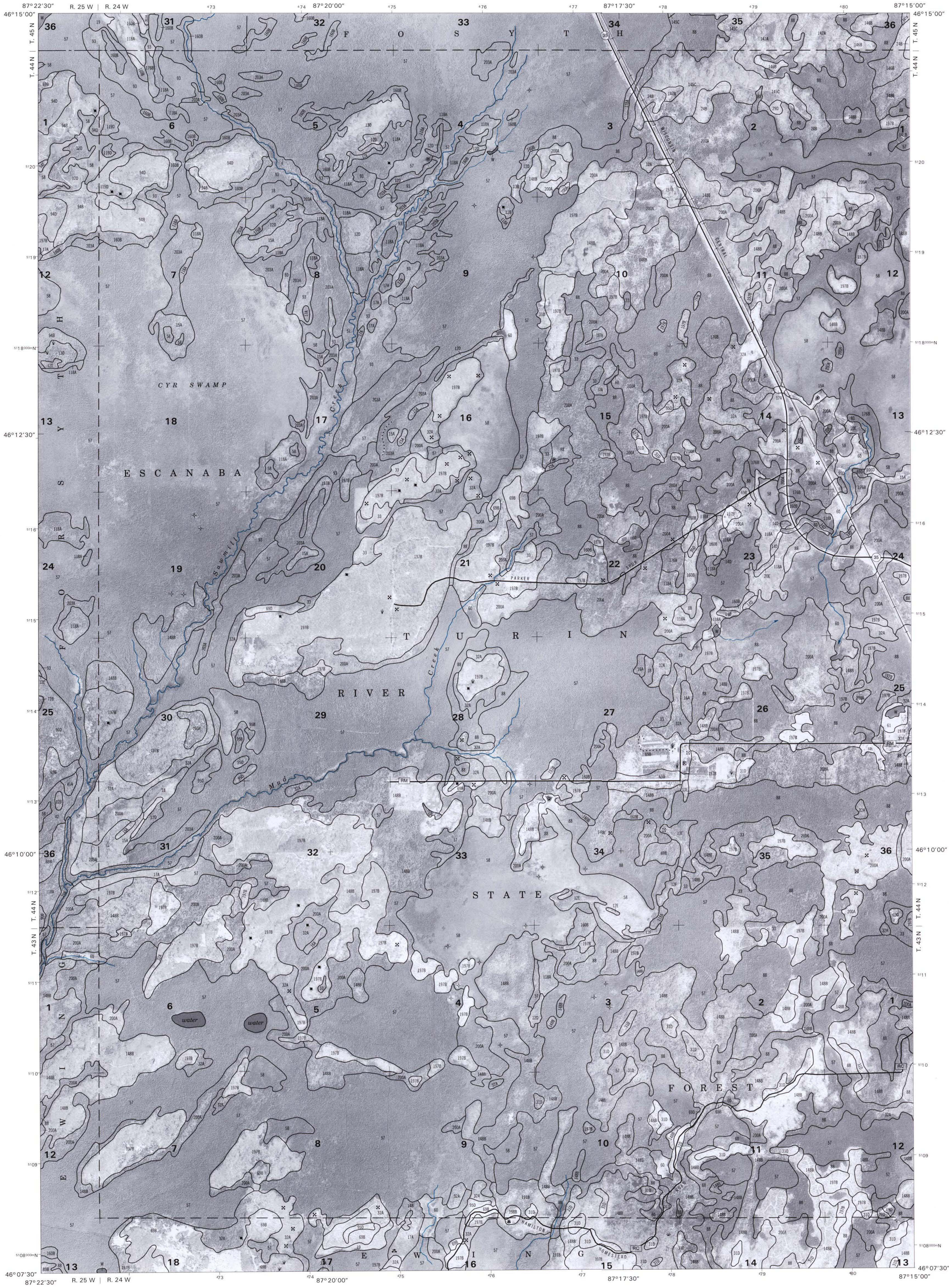
1	2	3
4		5
6	7	8

1 CATARACT BASIN (SHEET 74)
2 GWINN (SHEET 75)
3 LITTLE LAKE (SHEET 76)
4 NORTHLAND NE (SHEET 83)
5 HELENA (SHEET 85)
6 NORTHLAND (SHEET 88)
7 ARNOLD (SHEET 89)
8 SWIMMING HOLE CREEK (SHEET 90)

INDEX TO ADJOINING 7.5 MAPS

ANDERSON LAKE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 84 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE



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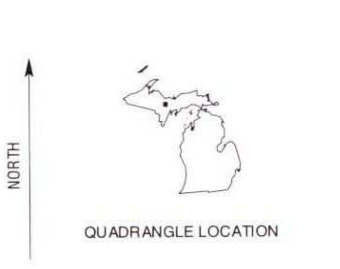
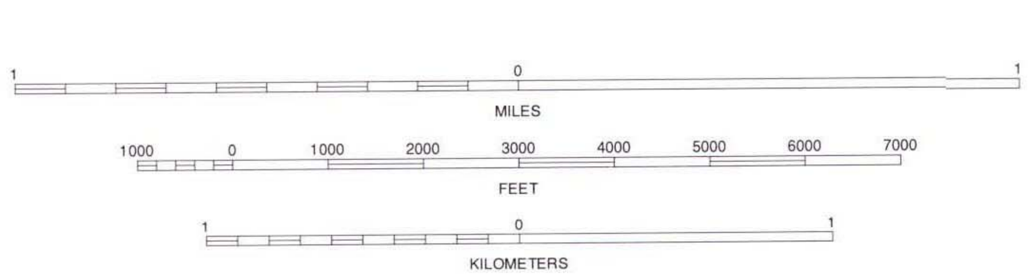
Digital data are available for this quadrangle.





1	2	3
4		5
6	7	8

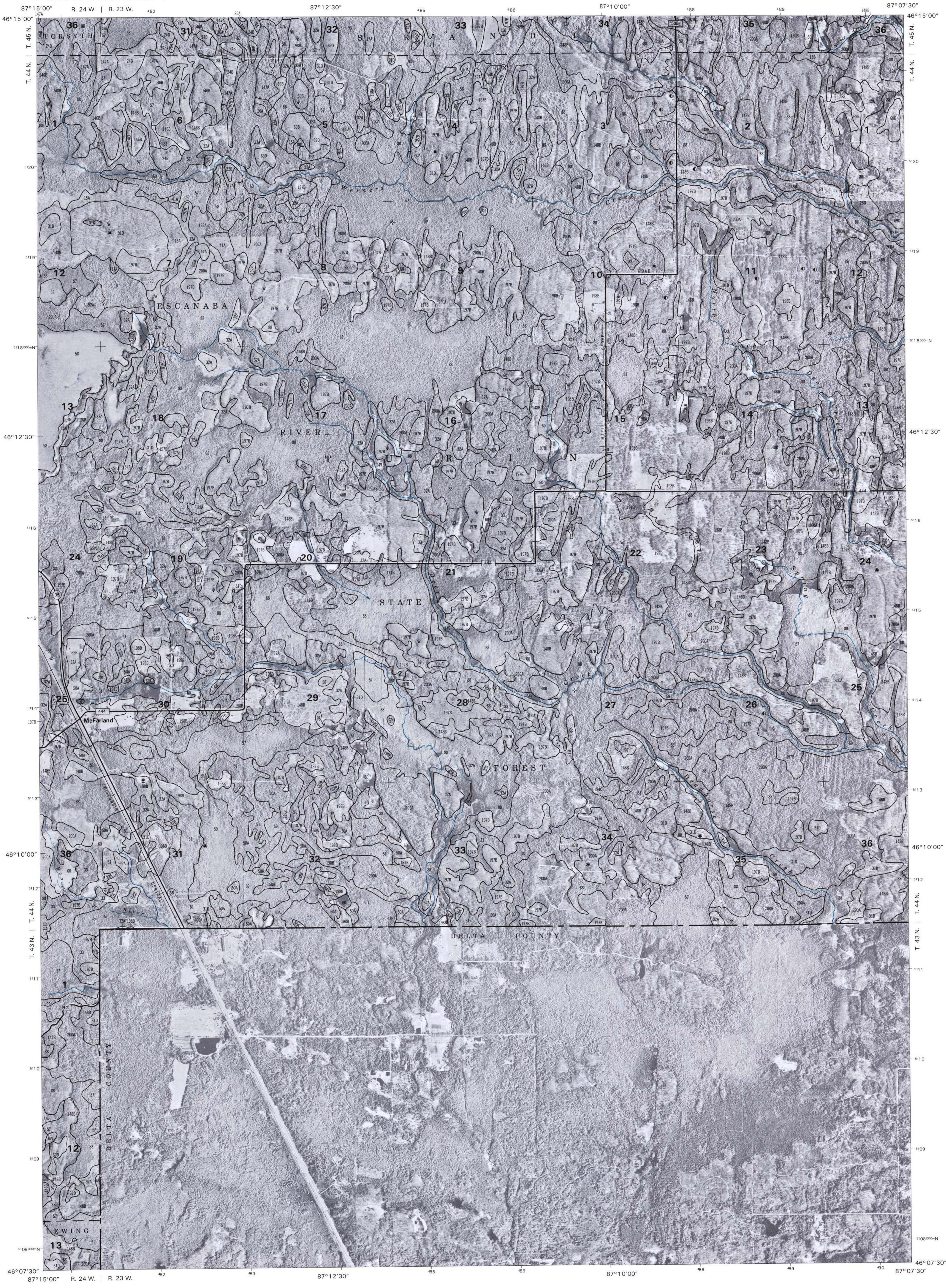
1 GWINN (SHEET 75)
2 LITTLE LAKE (SHEET 76)
3 CARLSHEND (SHEET 77)
4 ANDERSON LAKE (SHEET 84)
5 MCFARLAND (SHEET 86)
6 ARNOLD (SHEET 89)
7 SWIMMING HOLE CREEK (SHEET 90)
8 ROCK (SHEET 91)

INDEX TO ADJOINING 7.5 MAPS

HELENA, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 85 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
MCFARLAND QUADRANGLE
SHEET NUMBER 86 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 LITTLE LAKE (SHEET 76)
2 CARLSHEND (SHEET 77)
3 LADOGA (SHEET 78)
4 HELENA (SHEET 85)
5 DIFFIN (SHEET 87)
6 SWIMMING HOLE CREEK (SHEET 90)
7 ROCK (SHEET 91)
8 ROCK SE (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

MCFARLAND, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 86 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
DIFFIN QUADRANGLE
SHEET NUMBER 87 OF 95

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

1 CARLSHEND (SHEET 77)
2 LADOGA (SHEET 78)
3 CHATHAM (ALGER COUNTY)
4 MCFARLAND (SHEET 86)
5 TRENARY (ALGER COUNTY)
6 ROCK (SHEET 91)
7 ROCK SE (DELTA COUNTY)
8 BAKER CREEK (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

DIFFIN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 87 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
NORTHLAND QUADRANGLE
SHEET NUMBER 88 OF 95

This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 NORTHLAND NW (SHEET 82)
2 NORTHLAND NE (SHEET 83)
3 ANDERSON LAKE (SHEET 84)
4 ALFRED (DICKINSON COUNTY)
5 ARNOLD (SHEET 89)
6 FOSTER CITY (DICKINSON COUNTY)
7 HELPS (SHEET 92)
8 LA BRANCHE (SHEET 93)

INDEX TO ADJOINING 7.5 MAPS

NORTHLAND, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 88 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
ARNOLD QUADRANGLE
SHEET NUMBER 89 OF 95

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1	2	3
4		5
6	7	8

1 NORTHLAND NE (SHEET 83)
2 ANDERSON LAKE (SHEET 84)
3 HELENA (SHEET 85)
4 NORTHLAND (SHEET 88)
5 SWIMMING HOLE CREEK (SHEET 90)
6 HELPS (SHEET 92)
7 LA BRANCHE (SHEET 93)
8 WOODLAWN (SHEET 94)

INDEX TO ADJOINING 7.5 MAPS

ARNOLD, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 89 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 ANDERSON LAKE (SHEET 84)
2 HELENA (SHEET 85)
3 MCFARLAND (SHEET 86)
4 ARNOLD (SHEET 89)
5 ROCK (SHEET 91)
6 LA BRANCHE (SHEET 93)
7 WOODLAWN (SHEET 94)
8 CORNELL (SHEET 95)

INDEX TO ADJOINING 7.5 MAPS

SWIMMING HOLE CREEK, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 90 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
ROCK QUADRANGLE
SHEET NUMBER 91 OF 95

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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

1 HELENA (SHEET 85)
2 MCFARLAND (SHEET 86)
3 DIFFIN (SHEET 87)
4 SWIMMING HOLE CREEK (SHEET 90)
5 ROCK SE (DELTA COUNTY)
6 WOODLAWN (SHEET 94)
7 CORNELL (SHEET 95)
8 PERKINS (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

ROCK, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 91 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
HELPS QUADRANGLE
SHEET NUMBER 92 OF 95

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

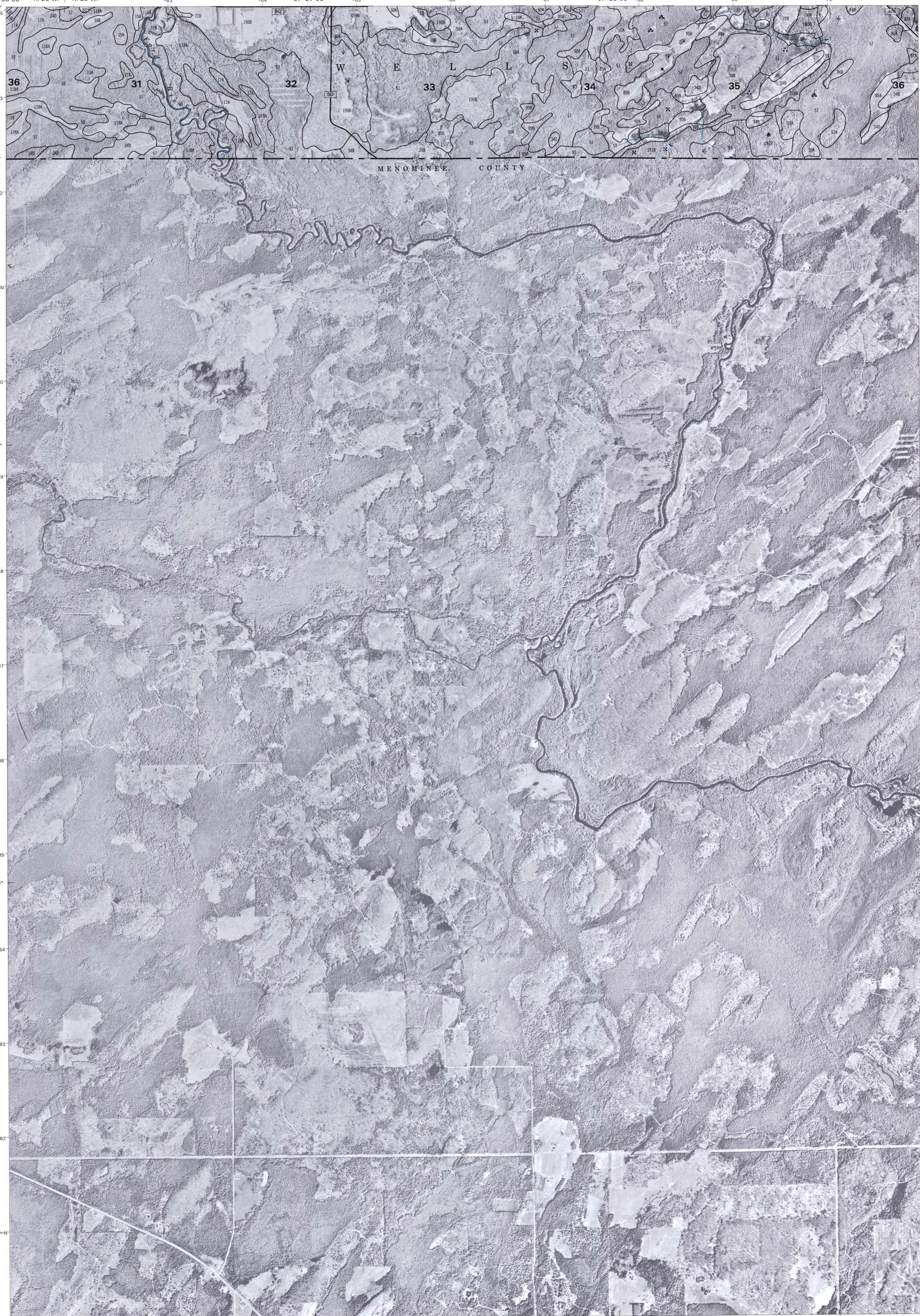
INDEX TO ADJOINING 7.5 MAPS

1 ALFRED (DICKINSON COUNTY)
2 NORTHLAND (SHEET 88)
3 ARNOLD (SHEET 89)
4 FOSTER CITY (DICKINSON COUNTY)
5 LA BRANCHE (SHEET 93)
6 WAUCEDAH (DICKINSON COUNTY)
7 VEGA (MENOMINEE COUNTY)
8 WHITNEY (MENOMINEE COUNTY)

HELPS, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 92 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
LA BRANCHE QUADRANGLE
SHEET NUMBER 93 OF 95



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Land division data are approximately positioned.

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Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

1 0 1
MILES

1000 0 1000 2000 3000 4000 5000 6000 7000
FEET

1 0 1
KILOMETERS

1	2	3
4		5
6	7	8

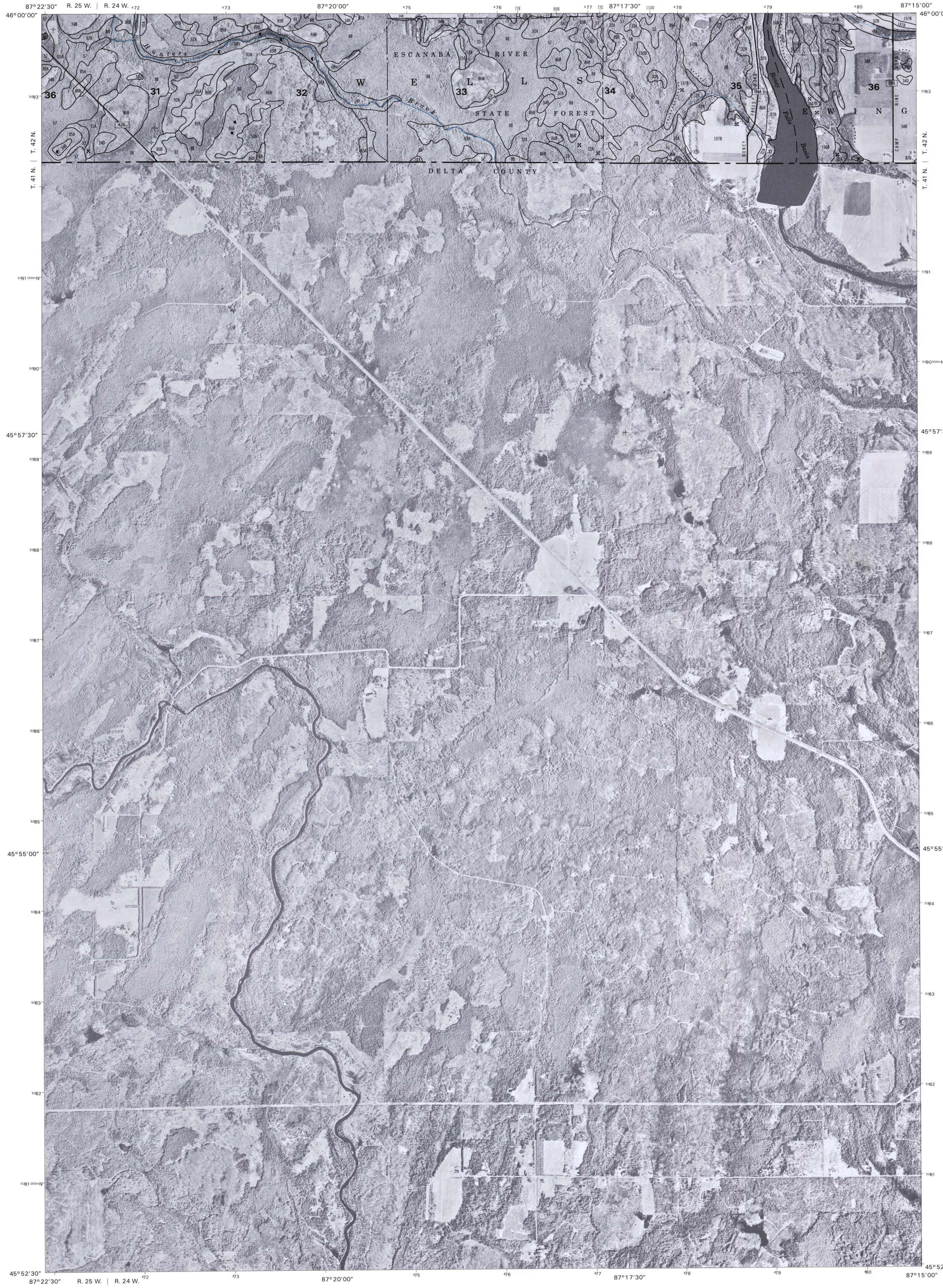
1 NORTHLAND (SHEET 88)
2 ARNOLD (SHEET 89)
3 SWIMMING HOLE CREEK (SHEET 90)
4 HELPS (SHEET 92)
5 WOODLAWN (SHEET 94)
6 VEGA (MENOMINEE COUNTY)
7 WHITNEY (MENOMINEE COUNTY)
8 SCHAFFER (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

LA BRANCHE, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 93 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
WOODLAWN QUADRANGLE
SHEET NUMBER 94 OF 95



This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service (formerly Soil Conservation Service), and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1992-1994 aerial photography, in Universal Transverse Mercator (UTM) Zone 16, using North American Datum of 1983 (NAD83), GRS-80 Spheroid.
Land division data are approximately positioned.

1000 meter tick marks at the map edges are consistent with printed USGS topographic sheets, which show North American Datum 1927 (NAD27) coordinates based on the Clarke 1866 Ellipsoid.

Digital data are available for this quadrangle.

NORTH

QUADRANGLE LOCATION

MILES

FEET

KILOMETERS

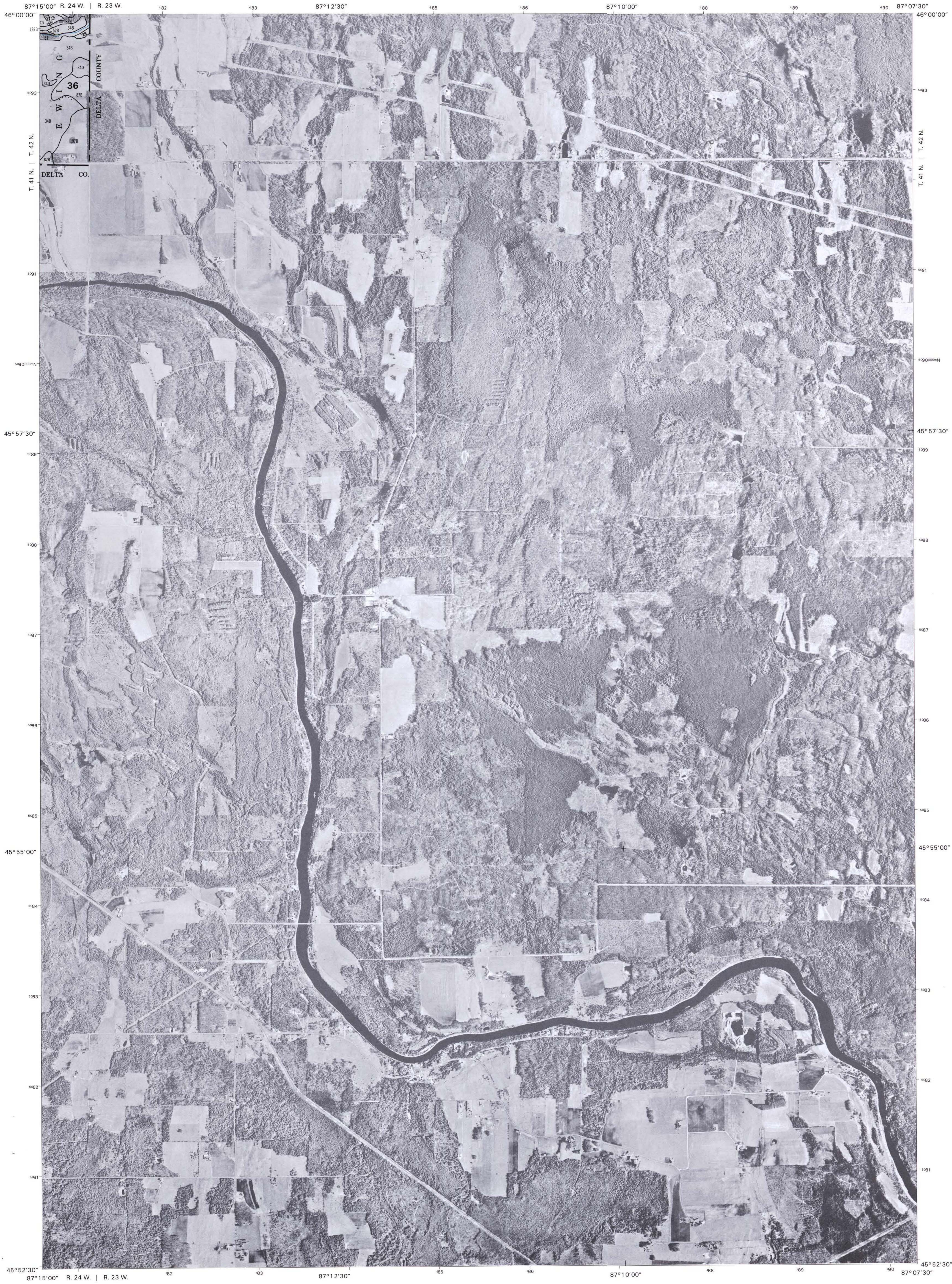
1 ARNOLD (SHEET 89)
2 SWIMMING HOLE CREEK (SHEET 90)
3 ROCK (SHEET 91)
4 LA BRANCHE (SHEET 93)
5 CORNELL (SHEET 95)
6 WHITNEY (MENOMINEE COUNTY)
7 SCHAFFER (MENOMINEE COUNTY)
8 CHANDLER (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

WOODLAWN, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 94 OF 95

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

MARQUETTE COUNTY, MICHIGAN
CORNELL QUADRANGLE
SHEET NUMBER 95 OF 95



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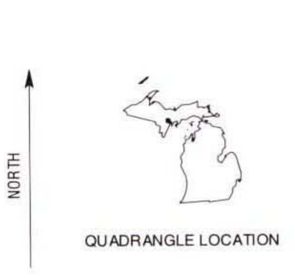

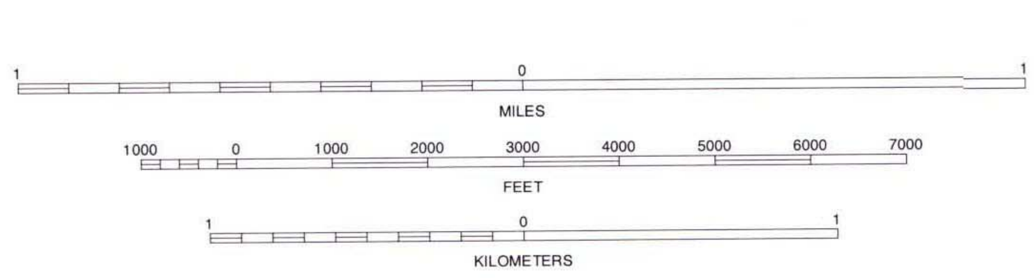

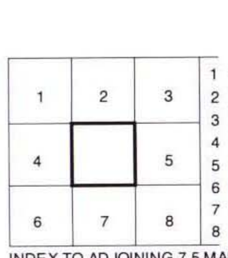

1 SWIMMING HOLE CREEK (SHEET 90)
2 ROCK (SHEET 91)
3 ROCK SE (DELTA COUNTY)
4 WOODLAWN (SHEET 94)
5 PERKINS (DELTA COUNTY)
6 SCHAFFER (DELTA COUNTY)
7 CHANDLER (DELTA COUNTY)
8 GLADSTONE (DELTA COUNTY)

INDEX TO ADJOINING 7.5 MAPS

CORNELL, MICHIGAN
7.5 MINUTE SERIES
SHEET NUMBER 95 OF 95